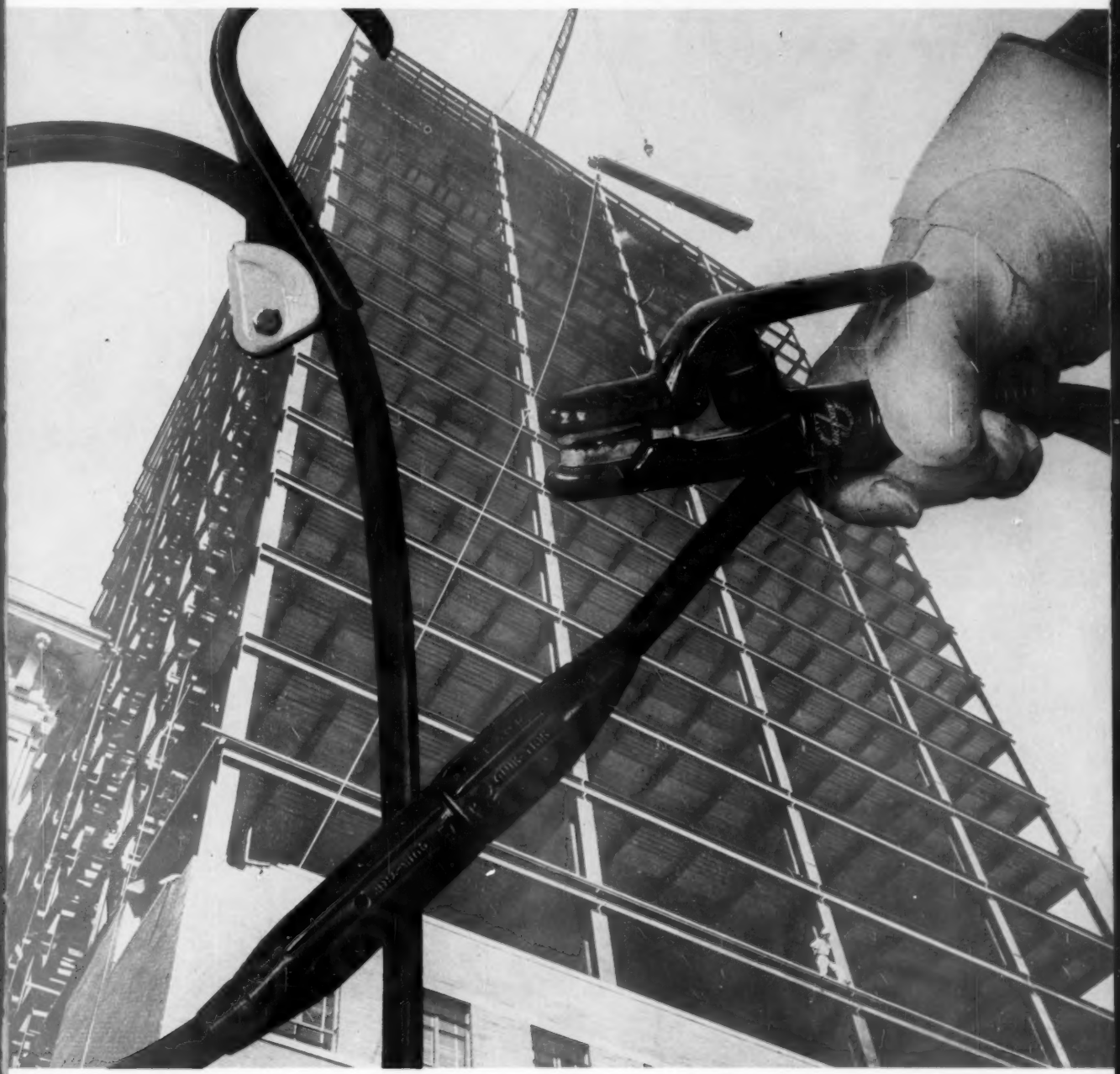
Welding Engineer

PRICE 50 CENTS

DECEMBER, 1959



Three great tools for construction workers: the Jackson insulated electrode holder, the 'Quik-Trik' cable connector with neoprene rubber insulators, and the new 'Cablehitch' for overhead suspension of welding cable, gas or air hose.

Jackson Products

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Jobs get done faster, easier, better . . . thanks to Carol Cable's exceptional flexibility, strength and extra-long life. Its superior flexibility means easier handling . . . faster, more efficient work with less fatigue. And its *built-in* toughness assures longer life —cuts down on work interruptions and saves on replacement costs. Make certain this superior quality is reflected in your jobs.

Readily available from a network of warehouses across the country. Furnished on 500 or 1000 ft. "no charge" reels, or in coils.

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NATIONAL WELDING EQUIPMENT ASSOCIATION MEMBER

Here's the most versatile combination anyone could ask for...

READ WHAT EXPERTS HAVE TO SAY ABOUT THE NEWEST HOBART—

DC, AC welding + AC and DC power

100% DUTY CYCLE lets you weld all day using 250 amps. DC at 30 volts or 300 amps. AC at 30 volts. A wide welding range (30-275 amps. DC, 30-325 amps. AC) in 500 accurately controlled steps simplifies the operator's job—improves his efficiency—because he can pick the exact welding heat for every job.

NO SWITCHES OR ADJUSTMENTS NEEDED TO DRAW UP TO 3KW AC power while welding with either AC or DC current (up to 10KW AC power is also available). The operator can use lights, tools, sprays, etc. and never have to leave his work—making him more productive by allowing him to use the right tools the instant he needs them.

WELD WITH DC OR AC FOR BEST RESULTS ON EVERY JOB
The extra large (25 gallon) fuel tank provides extended operation. Powerful, economical water-cooled Willys Jeep engine has push button self starting fuel pump, filter.

IT'S AN IDEAL POWER SOURCE FOR "TIG" WELDING
Just plug in a Hobart "TIG/PAK*" for in-the-field inert gas welding. Leave the welder in one spot—then take only the "TIG/PAK" to the work.

IT PAYS TO CHOOSE . . . IT PAYS TO USE
WELDERS · ELECTRODES by HOBART

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*Model 1189 TIG/PAK

Here's the answer to the problem of getting best possible results from TIG welding *in any location*. The "TIG/PAK" can be carried, hoisted or trundled to the job, connected by only the usual welding cable to a welder. No expensive plumbing installation required.

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Phone FE 2-1223 "Manufacturers of the world's most complete line of arc welding equipment"

HOBART BROTHERS CO., BOX U-129, TROY, OHIO
Yes—I'd like to know more about ☐ The new Hobart "AC-DAC" Welder ☐ Model 1189 "TIG/PAK"
My work is_____

*Name*_____
*Address*_____
*City*_____ *Zone*____ *State*_____

HIGH QUALITY ELECTRODES by HOBART

3 HOBART iron powder ELECTRODES

...deposit more metal for MORE PROFIT *.. speed welding .* *. lower production costs*

ROCKET 14

- General Purpose
- All-position
- 30% of coating is iron powder
- Makes an ideal utility fabrication electrode

ROCKET 14
(E-6014-7014)

ROCKET 24

- Excellent deposition
- Flat and horizontal position
- 50% of coating is iron powder
- Delivers beautiful bead appearance for finish pass

ROCKET 24
(E-6024-7024)

ROCKET 27

- Superior physical properties
- Deep groove and flat
- Over 50% of coating is iron powder
- Speed combined with quality deposit

P.S. Don't overlook this electrode when ductility is a factor. (Its elongation in 2" = 25% to 35%)

ROCKET 27
(E-6027)

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Yes, I'd like to know more about ☐ Rocket 14 ☐ Rocket 24 ☐ Rocket 27

My work is _____

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Name _____

Address _____

City _____ Zone ____ State _____

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MAIL THIS COUPON

. . . for prompt and more complete information!

VOL. 44 — No. 12

The magazine of joining and severing of materials

Welding Engineer

This is welding: December, 1959

WELD AND CUT IN SAFETY

Welding safety "why's" 29

To bridge the gap between knowing safety procedures and applying them, *WE* introduces its special safety issue with this article detailing the "why's" of safety devices, precautions and rulings.

★ (For a reprint of this article, circle number 250.)

Leather shortages causing higher garment, glove prices 33

In another of its current special reports, *WE's* Research Dept. queried several major leather and glove manufacturers. The result is a definitive glimpse at the leather market and its future effects on the welding industry.

New products designed for safety 34

Today's weldor can be protected from head to toe from any welding or cutting hazards. Here is a representative collection of the safety devices available to the industry.

Safety in '60's draws 12,500 persons 36

Every possible aspect of industrial safety was covered at the 47th National Safety Congress by 834 speakers at the more than 200 sessions. Exhibitors shown in this article were among the 190 at the Chicago show.

Protect lives, jobs, property when welding and cutting 38

You can set up your own safety program with this chart-like run-down of the main causes of fire and the ways to eliminate fire hazards.

Semiautomation in resistance welders 46

More speed and less cost in consumer goods production is the driving force behind automation. Author **Douglas D. Williams** reports on one automated resistance welding operation shown at a recent British welding show.

Welded structures dominate bridge competition awards 50

More than 70% of the winning designs in U. S. Steel's American Bridge Div.'s competition made extensive use of welding. The awards, announced in late October, are listed, and some of the winning designs shown.

Also in this issue:

Foil-gage steel rocket chambers spot welded 40
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Drill-rod production speeded by submerged-arc 56
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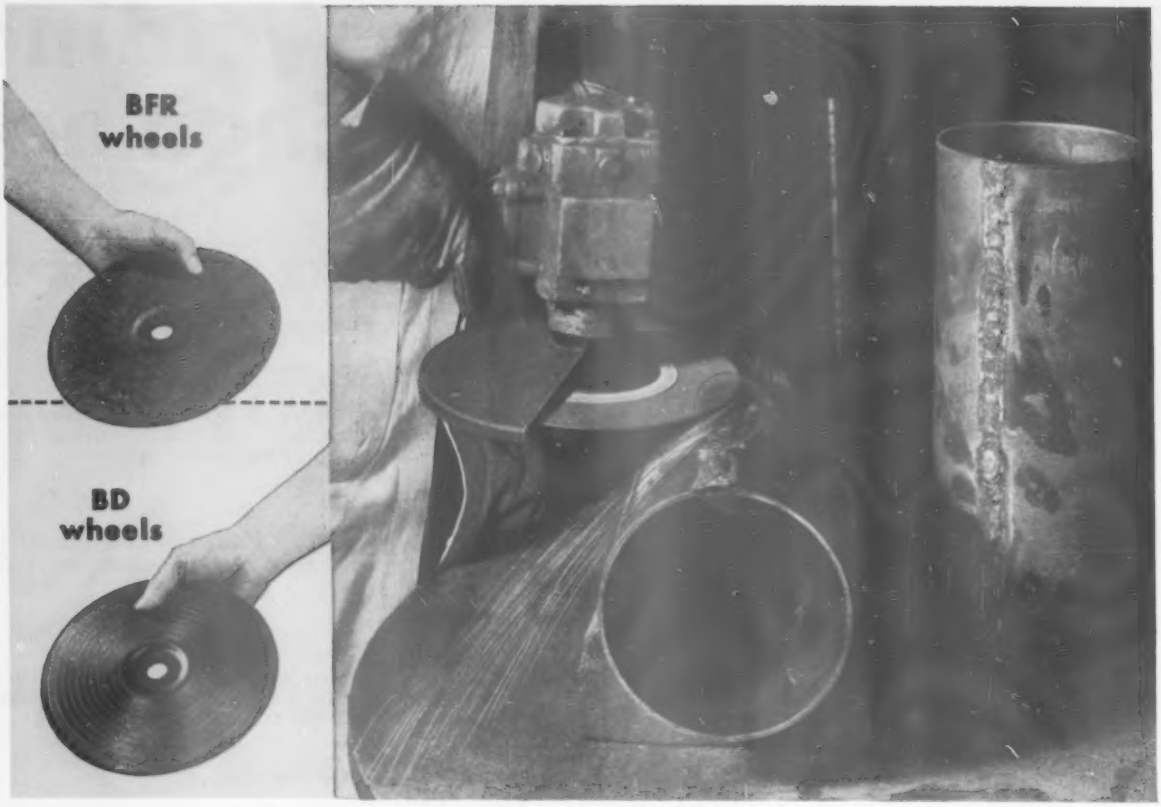

Reinforced to cut grinding costs . . . all around your shop

Norton BFR and BD wheels are extra strong . . . add extra speed and economy to light and heavy jobs

The BFR Wheel is the one you see in action above. A free-cutting, semi-flexible, hub-type wheel, the BFR is made of cotton fabric, reinforced with strong nylon webbing. It adds the money-saving "Touch of Gold" to lighter weld grinding — as well as to blending contours and corners, removing rust and scale, scarfing and beveling before welding, reaching hard-to-get-at places.

The BD Wheel gives best performance on your toughest jobs. Made of glass cloth plus nylon, this rigid hub-type wheel is ideal for grinding medium to heavy welds, including stainless steel — and for smoothing flame-cut edges, removing fins from castings, slotting, notching and cutting-off. Available in three grades of hardness.

Just two of the complete line of Norton reinforced wheels, the BFR and BD handle an almost endless list of weld shop grinding jobs. To get complete details on their built-in strength, versatility and resistance to breakage, ask your Norton Distributor for the catalog on Norton reinforced wheels, Form 1748. Or write to NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors around the world.

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NORTON PRODUCTS Abrasives • Grinding Wheels • Grinding Machines • Refractories • Electrochemicals — BEHR-MANNING DIVISION Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

WELDING ENGINEER

Your December, 1959

WeldWorld

As WE went to press, these were the industry's latest developments:

. . Ransome, a name first attached to welding positioners in 1932, will return to prominence with establishment of the Ransome Co., division of Big Three Welding Equipment Co., Houston. The latter has purchased the positioner and manipulator division of Worthington Corp. Paul Galton heads the new organization.

. . Notice of price reduction is always welcome news, especially in these times. Elmet Division of North American Philips Co., Lewiston, Maine, has announced lower prices on cleaned finish tungsten electrodes and the introduction of a polished finish line at prices between the cleaned and ground finish.

. . Magnaflux Corp., Chicago, has been acquired by General Mills, Inc., Minneapolis, and will continue as a subsidiary. For full details, see page 7.

. . Air Reduction Co., Inc., posted a record nine-month sales mark this year. Both sales and income were up 17.3% over the similar period of 1958.

. . In a talk before the American Gas Association in Chicago, Secretary of the Interior Seaton called for renewed efforts to conserve helium. Most of the nation's supply of this scarce gas goes to market with commercial natural gas and is lost in the atmosphere. The solution: extraction plants to be located on helium-bearing pipelines.

. . Immediately after the welding show in Los Angeles next April, the American Welding Society is planning a Mid-Pacific Conference in Hawaii.

. . Newest competitor for metal-cutting devices: electrified salt water. A squirt of such liquid is said to cut through toughest of steels. Process essentially is electroplating in reverse—current carried through brine dissolves metal instead of depositing it.

. . Steel strike is over—at least temporarily—but shortages continue at this writing. It is expected to take several weeks before flow of steel from mills catches up with demand. If settlement is not reached during injunction period, look for new, tougher, legislation to prevent another walkout.

. . Although Linde Co.'s Oxweld, Sigma and Unionmelt equipment and supplies now have been made available through qualified distributors (WeldWorld, Nov., p. 13), you still can purchase the lines directly from the manufacturer. The new channels of distribution are in addition to Linde's direct sales and service facilities.

Preheating carbon-moly tubing with Victor Model J27 torch and Type 28 heating nozzle at Besler Corp., Emeryville, Calif.

The man on the job likes Victor torch flexibility

Flexibility is built into all Victor torches, regardless of size. Here, for example, Series J torches are being used to preheat, then weld ⅝" O.D. with .095" wall tubing for steam generators. With a change of nozzles and tips these same torches braze and solder . . . with the addition of a cutting attachment, can be used for light cutting applications and ocasional short jobs up to approximately 2" steel.

Victor Series 100 torches for medium-duty work and the famous Series 300 for tough, heavy work, give you this same flexibility . . . heating, welding, brazing, soldering, cutting. All 3 sizes, with proper cutting attachment, can be used with oxygen-acetylene, oxygen-propane, oxygen-city or natural gas.

Ask your Victor dealer for a demonstration now. You'll see for yourself how Victor torches answer all your welding and cutting needs.

Welding ⅝" O.D. with .095" wall tube into generator coil, using Model J27 torch and Type 17 welding nozzle with oxy-acetylene.

Profitable dealerships open in a few areas; inquire now.

VICTOR for welding and cutting

VICTOR EQUIPMENT COMPANY

Mfrs. of welding & cutting equipment; high pressure and large volume gas regulators; hardfacing rods, blasting nozzles; cobalt & tungsten castings; straightline and shape cutting machines.

62

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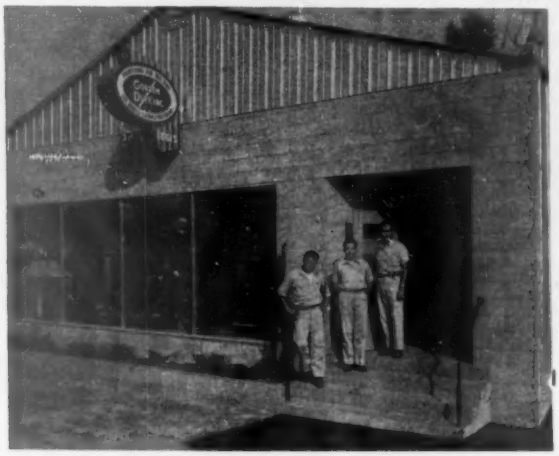
1145 E. 76th St., Chicago 19
J. C. Menzies & Co., Wholly-Owned Subsidiary

Duff opens new outlet; National exhibits in India



GORDON Duff Inc., has opened its second major plant branch (above) in California's San Fernando valley at 18615 Parthenia St., Northbridge. The firm also recently installed a 250,000-cu-ft liquid oxygen pumping station at its west Los Angeles headquarters. Shown above, from left, Bob Benninger, Jack Olsen and manager Marvin Dittus.

NATIONAL Welding Equipment Co., San Francisco, had this exhibit at International Trade Fair sponsored by United States in Madras, India. Company's export transactions are handled by Southern Oxygen Co. Export Div. in New York City. Company has had other such exhibits in various Indian cities.

General Mills acquires Magnaflux Corp.

General Mills Inc., Minneapolis, has acquired the business and assets of Magnaflux Corp., Chicago developer of techniques and equipment for detecting hidden flaws in industrial materials.

Magnaflux will continue in business at its present location under the same name as a wholly-owned subsidiary.

Magnaflux offers non-destructive testing systems based on magnetic, ultrasonic, electronic and fluorescent applications, in addition to stress analysis and field inspection services.

F. B. Doane will retire as Magnaflux president and chairman of the board, but will continue to serve the company as a consultant. Key officers and personnel of the firm will retain their present positions.

R. A. Wilson, General Mills vice president and general manager of its Mechanical Division, will be the new president of Magnaflux. W. C. Babcock, of the firm's legal department, will be secretary.

Those officers remaining with the Chicago Corp., are: W. E. Thomas, executive vice president; C. E. Betz, vice president and assistant to the president; W. D. Reid, vice president, manufacturing, and treasurer; R. O. Schiebel, vice president, marketing; Hamilton Migel, vice president, research and engineering.

COMING EVENTS

DEC. 3-4: NWSA Southwestern Zone Meeting, Hotel Texas, Fort Worth.

JAN. 20, 1960: Metallurgical Society of AIME, Flat Rolled Products Conference, Del Prado Hotel, Chicago.

JAN. 25-28, 1960: Plant Maintenance and Engineering Show, Convention Hall, Philadelphia.

FEB. 3-4, 1960: Midwest Welding Conference, Illinois Tech Chemistry Building, Chicago.

APRIL 4-7, 1960: 1960 Atomic Exposition, New York Coliseum, New York City.

APRIL 25-29, 1960: 41st Annual Convention, AWS, The Biltmore Hotel, Los Angeles.

APRIL 26-28, 1960: AWS Exposition, Great Western Exhibit Center, Los Angeles.

MAY 5-7, 1960: NWSA 16th Annual National Convention, Palmer House, Chicago.

MAY 9-10, 1960: Annual Convention, International Acetylene Association, San Francisco.

MAY 9-13, 1960: Southwestern Metal Exposition, State Fair Park, Automobile Building, Dallas, Tex.

Galv-Weld starts new distribution program

Galv-Weld Products, Bradenton, Fla., has started a new distribution program for Galv-Weld alloy, whereby independent distributors will be appointed throughout the country.

The Galv-Weld process was developed, patented and trade mark registered in 1936 by Morton L. Clark. The process is for regalvanizing otherwise corrosive seams and areas where galvanizing is burned away by welding, skipped, or abraded or chipped in fabrication.

The new distribution policy was tested in Chicago last year.

NEWS

Anchor Metals forms separate corporation

Anchor Metals, Inc., Brooklyn, has formed a new and separate corporation known as Anchor Alloys, Inc. The new firm will specialize in the manufacture of the precious alloys required in electronic semiconductors at 968 Meeker Ave., Brooklyn.

The parent firm, Anchor Metal Co., Inc., has appointed Chafin and Associates, Los Angeles, as its West Coast representative.

NWSA honors associate member

Arthur D'Espies of Welding Alloy Mfg. Co., Newark, was presented with a special honor at the recent Eastern Zone meeting of the National Welding Supply Association held in the Hotel Roosevelt, New York City.

The firm has been an associate member since 1947, with D'Espies having served as unofficial sergeant-at-arms at zone meetings and conventions. The engraved plaque, recognizing his service efforts, read:

"The members of the NWSA hereby recognize and express sincere appreciation for the devoted efforts and untiring interest extended in their behalf by Arthur D'Espies, who has faithfully served this association of distributors and manufacturers in the best interests of the welding industry."

Next month . . .

"The Soaring Sixties"

WELDING ENGINEER feels the next 10 years will offer the greatest opportunity ever afforded our industry. Many of our colleagues—both users and manufacturers of welding equipment—agree with us. For their predictions, don't miss the January issue.

Maintenance show, meeting to be held in Philadelphia

Seventy-one speakers will address the 11th Plant Maintenance & Engineering Conference to be held in Philadelphia from Jan. 25 to 27. The conference is being held in conjunction with the Plant Maintenance and Engineering Show, from Jan. 25 to 28.

L. C. Morrow, consulting editor, *Factory*, will serve as general chairman of the conference. Speakers, who will lead 43 sessions, are drawn from 52 companies, in 20 basic industries located in 19 states and three Canadian provinces. Both show and conference will be held in Convention Hall.

Tuesday morning, Jan. 26, a session will be held to discuss "Welding advances adaptable to maintenance." Chairman will be K. M. Spicer, technical service, Huntington Alloy Products division, International Nickel Co., New York City.

Lincoln Foundation awards announced

The James F. Lincoln Arc Welding Foundation, Cleveland, has announced the winners of its competitions for farm boys and engineering undergraduate designers.

Gregg Hollinger of Paul, Idaho, received the top national award for farm welding. He won $600 for building a branding and dehorning squeeze chute.

National honors were shared by 105 young farmers from 26 states. These boys, and the schools where they study shop mechanics as part of agricultural courses, received a total of $7,000.

A fire hydrant redesigned for welding won the first award of $1,250 for Seppo J. Viikinsalo of Parkville, Minn. Eight other students from Minnesota received undergraduate design competition awards, marking the best performance by students of any one school.

Scholarship funds honoring the recipients of the top awards were presented to the Universities of Minnesota, Illinois and New York.

The Arc Welding Foundation is conducting a similar contest for the current school year. A rules booklet can be obtained from the Foundation, Cleveland 17, Ohio.

Linde to build Michigan oxygen plant

Linde Co., New York City, plans to build a 500-ton-a-day oxygen plant at Great Lakes Steel Corp.'s Ecorse, Michigan, works.

Currently, four small oxygen plants with a total capacity of 100-tons-a-day are in use. But plans to add oxygen to open-hearth furnaces by roof lances have created the need for more oxygen.

Once in operation, the plant will produce 365,000,000 cu ft of high purity oxygen a month for use with the steel melting process, mechanized scarfing and finishing and general maintenance requirements.

Ultrasonic scanner tests sheet steel

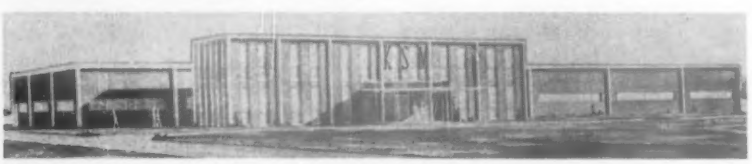
An ultrasonic method of detecting imperfections in sheet steel has been developed jointly by Sperry Products Inc., Danbury, Conn., and the Chrysler Corp., Dayton, Ohio.

The system peers into sheets of steel unwinding at a rate of 200 fpm. Placed between the unwinding coil of steel and the blanking machine, which cuts the sheets into various sizes for the stamping processes, it searches out laminations and sprays the faulty parts with a bright colored dye. The spotted steel is removed after it has gone through the blanking machine.

Sperry engineers believe that ultrasonic waves may soon be used to probe into the interiors of spot welds. A method is now being tested that would accept or reject 300 spot welds every four and a half seconds. There are some 3,500 spot welds in a modern car body, and destructive tests to determine whether or not they are forming metal unions are very costly.

In picture with scanner are men who helped develop it, E. A. Strohauer (right) of Chrysler, and Brook Galloway of Sperry.

KSM building new quarters



KSM Products Inc., manufacturers of stud welding fasteners, equipment and accessories has recently broken ground for its new plant and office facilities as shown in artist's conception above. New building will be located on a 12 acre tract in Moorestown, N. J. Occupancy and full operation of the new quarters is expected by spring of 1960.

Distributor appointments

Olin Aluminum, Olin Chemical Corp., New York City: Lockhart Iron & Steel Co., McKees Rocks, Pa.

Detroit Stamping Co., Detroit: Erie Industrial Supply Co., Erie, Pa.

American Platinum Silver Div., Engelhard Industries Inc., Newark: National Welding Supply Co., Charlotte, N. C.

Tracerlab Inc., Waltham, Mass.: R. L. Holliday Co., Pittsburgh and Cleveland.

here is an outfit which will make you proud to own it . . .

With a most acceptable price tag goes the very highest quality and safety your money can buy . . .

only $89.50

By all means — look at other "package" outfits first to make you the more certain that this one is the best for you.

• • •

here's why this combination welding and flame cutting outfit is actually the very finest your money can buy...

This new outfit, the Five Star Pak, was designed particularly for the smaller shop, for farm use, garages, the hobbyist, or any one whose welding and cutting operations are diversified and more limited in scope and metal thicknesses . . .

An economy outfit can be economical only if it will perform well and for many satisfying years to come. If it fails to meet highest standards, it ceases to merit all consideration . . .

Extendable? By all means. This Five Star Pak is amazingly versatile. It may be extended as the needs expand. Larger or smaller nozzles or tips fit the torches as do multiple flame nozzles so convenient for many brazing operations. The cutting attachment, for instance, may cut easily up to four inches of steel thickness.

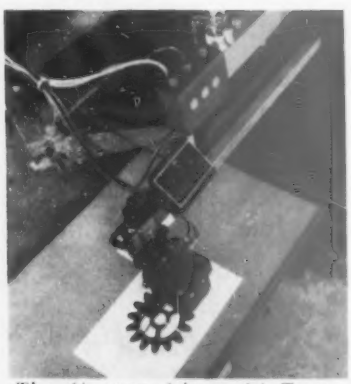
You can buy with confidence from a company which has been in the business of making fine equipment for nearly fifty years.

WRITE FOR THE ILLUSTRATED FOLDER #17 which gives you all of the information you ought to consider . . .

552 DEPT.

NATIONAL welding equipment company... 218 fremont street san francisco 5 california

the Airco LINAGRAPH



The Aircotron (electronic) Tracer accurately follows a gear templet.

The Airco LINAGRAPH is the newest, finest multiple torch machine on the welding market today for flame cutting intricate shapes out of mill plate up to 96″ wide, in any length.

The LINAGRAPH's pantograph design enables its Aircotron (electronic) Tracer to follow a templet so precisely that in most cases further finishing of the flame cut part is unnecessary.

The LINAGRAPH features also a central location of all controls. Furthermore, the tracing table moves easily on rollers—lets you move the templet without moving the work itself.

It cuts steel plate up to 96″ wide and up to 12″ thick, using acetylene, natural or city gas or propane with up to six torches. The LINAGRAPH requires floor space only 19′3″ wide.

Extra lengths of rails and tracks and extra tracing tables can be ordered, and right- or left-hand operation is available.

For complete information on the New Airco LINAGRAPH, phone your nearest Air Reduction office. Or write us today for Catalog 804L.

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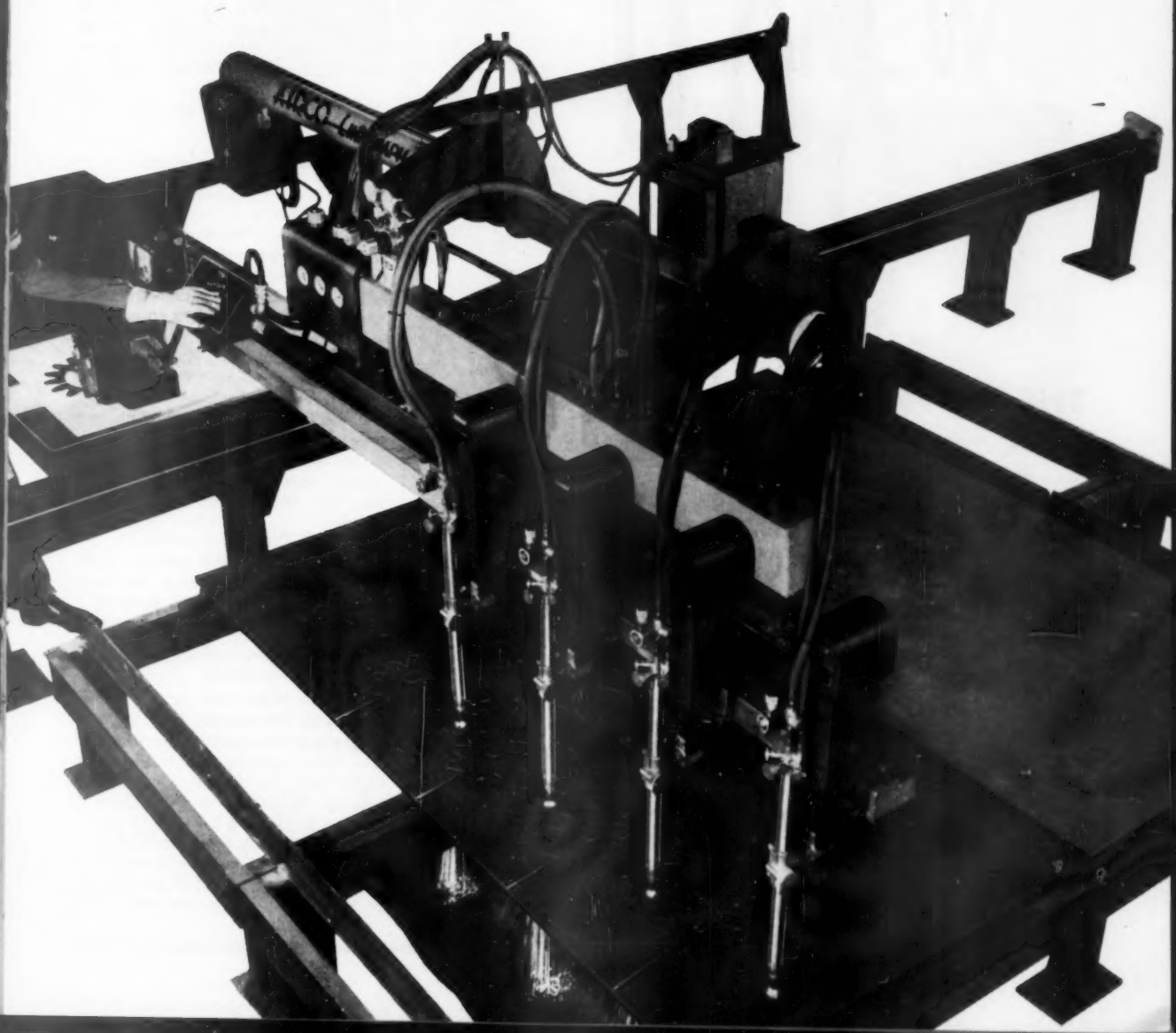
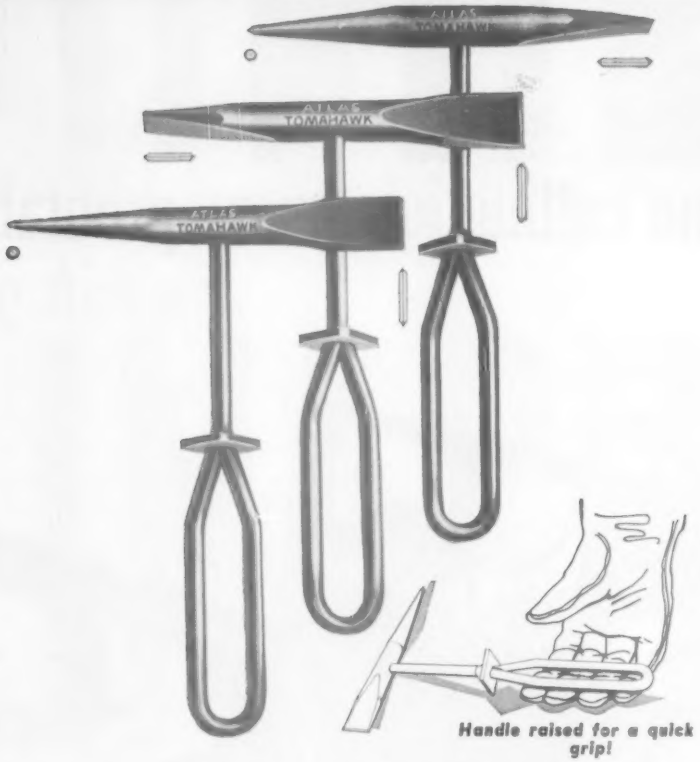
to make your flame cutting jobs more profitable



ATLAS | WIDE-BLADE TOMAHAWKS

WORLDS LEADING WELD CLEANING TOOLS



Handle raised for a quick grip!

THE *NEW* ATLAS *"EASY-GRIP"!*

WITH "WIDE BLADE" THAT SPEEDS THE JOB

This is our economy tool—yet it has all these famous Atlas features: (1) Forged head of chisel steel with 18% wider blade for faster work with less effort. (2) Head can't come off or turn on shaft. (3) One piece steel shaft and grip that can't burn or splinter and lasts as long as the head . . . You'll like both the "feel" and balance of this husky, quality Atlas Tomahawk and you'll like the price, too! It is available in three models: cross chisel and cone, chisel and cross chisel, chisel and cone. At the price, you can own the set of three and be prepared for any job that comes along.

Tough as they come!

33 MODELS

Each Atlas tool is made as well as we know how. Ask your welding supply dealer to show you the complete line.

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Letters . . .

Letters should be addressed to: The Editor, WELDING ENGINEER, P. O. Box 28, Morton Grove, Ill. No letter will be published unless signed, but your name will be withheld if requested

Electrode manufacturers

Sir: *La Grange, Ill.*

Due to the large coverage of our export business we are often requested by our customers to provide specifications of a brand name of electrodes other than AWS or ASTM for use on our equipment in foreign countries.

Due to the cost of shipping, it is unfair to the customer to be expected to buy American where there is no representation, so we are taking the liberty of asking your publication to furnish (if possible) a list of electrode manufacturers and their addresses from the following countries: Germany, France, Spain, Japan, Thailand, India, Argentina, Brazil, and any African source.

C. M. Kotansky
Electro-Motive Div., GMC

Permission, please?

Sir: *Grand Rapids, Minn.*

I would like your permission to use your editorial, "Free(doms) benefits," which appeared in the November issue (p. 27) in our company publication. It is mailed to business establishments in town, and is distributed to all mill personnel.

I am a weldor in the maintenance department at the Blandin Paper Co., and receive *Welding Engineer* each month, first reading your fine editorials and press-time releases.

On other occasions, I have been tempted to write you for above permission, but simply could not pass this one by.

Douglas Anderson

—Mr. Anderson and his company's publication have been granted permission to reproduce the November editorial.

Russian readers

Sir: *Chicago*

. . . Two articles by you were cited recently in the August, 1959, issue of the Russian magazine *Welding Production*. This magazine has a section in which they cite foreign literature on welding. The articles are "Principles of welding techniques," and "The meaning and significance of weldability."

I thought you would be interested in knowing that the Russians are keeping track of the articles you are writing and

HERE'S THE FIRST SEMI-AUTOMATIC OPEN ARC WIRE FOR HIGH STRENGTH WELDS ON MANGANESE STEEL

WEAR-O-MATIC WH

Wear-O-Matic WH is the first 7/64″ diameter open arc wire for semi-automatic application providing acceptable high strength properties for welding manganese attachments to manganese or carbon steels.

Here's a new wire providing welds of greater strength and ductility than 14% manganese weld metal that can be applied by the easier, more economical Wear-O-Matic open arc semi-automatic process. The balanced, high alloy content of the fabricated wire is sufficient to overcome the effects of dilution with manganese or carbon steel resulting in a weld deposit in the fully austenitic range. This, of course, provides a tougher, more crack resistant weld deposit.

Wear-O-Matic WH serves a dual role in that the exceptional physical properties that provide strong ductile welds also provide a tough, deformation resistant mass when used as a build-up alloy. The deposit develops a surface hardness of 47–48 Rc under impact providing exceptionally good wear resistance.

NEW NEW NEW NEW NEW

- **For impact and compression resistant attachment welds . . . specify WEAR-O-MATIC WH**
- **For tough, dependable build-up deposits . . . specify WEAR-O-MATIC WH**
- **For greater economy in all of your hard surfacing and maintenance welding, call on your Alloy Rods factory branch or distributor.**
- **Write for Bulletin H5202 for details and locations. Alloy Rods Company, P. O. Box 1828, York, Penna.**

NEW NEW NEW NEW

Alloy Rods Company

YORK, PENNSYLVANIA • EL SEGUNDO, CALIFORNIA

CURTISS-WRIGHT

THERMOCHROM

Here's a foolproof way to check temperatures during welding or heat-treating operations . . . use new Thermochrom temperature-indicating color crayons.

Measurement of temperatures at stages between 150° and 1240° F. is possible with the different crayons in the Thermochrom family. Each crayon's wrapper shows its point-of-change temperature and the color that results. This color change does not "melt away" but gives a permanent record of the temperature reached, making it simple for anyone to check welding temperatures at a later time. Every Thermochrom crayon is usable to its full length. Priced at only $2.00 a crayon.

Use Thermochrom to solve your "heat checking" problems. For further information regarding where to buy and how to use Thermochrom, write to:

PRINCETON DIVISION
CURTISS-WRIGHT
CORPORATION · PRINCETON, N.J.

A central source for
GAMMA and X-RAY Equipment,
ULTRASONIC Testing Equipment,
Temperature Indicating Paint,
Application Studies and Training

of articles that appear in your magazine.

I also want to mention that while I was in the Soviet Union last May, I found copies of your magazine in the Lenin Library in Moscow and found that these magazines had been obtained from an office in Germany. This might be news to you since you probably do not send copies directly to the Soviet Union.

I believe the Russians read *Welding Engineer* and *Welding Journal* on a very regular basis, as a welding engineer I met over there was constantly quoting articles that he had read in these magazines.

Just wanted to pass this information along to you.

J. M. McCarthy
Research and Development
National Cylinder Gas

Correction

Sir. *Columbus*

In the article on spot-welding of tantalum that we wrote for the October issue of *Welding Engineer* (Resistance spot-welding of tantalum studied at Batelle) the fifth paragraph . . . is incorrect and should read as follows:

"Although tantalum can be spot welded to produce cast nugget-type bonds, joints in which no apparent melting occurs also can be made and may be satisfactory for some kinds of service. However, one major problem involved is electrode sticking which is more severe when making the cast nugget-type bonds than when making bonds in which no apparent melting occurs."

It would be appreciated if the correction could be brought to the attention of your readers, since the existing text does not agree with the accompanying photograph.

Roger L. Koppenhofer
Welding Engineer
Metals Joining Div.

"I think it's a present for his father."

MANHATTAN MOLDISCS

CUT FASTER... LAST LONGER

Manhattan Moldiscs are made in types to meet specific job requirements for use with mild steels, stainless alloys, aluminum or copper. Tests prove they're the most economical portable wheels you can use on right angle grinders . . . smoothing weldments, removing burrs, beveling edges. Manhattan Moldiscs cut cleanly and freely on the toughest roughing and finishing—without loading or glazing. They're safer to use, too, because they're light in weight, easy to handle . . . and reinforced with special super-strength synthetic fabric for greater safety. Manhattan Moldiscs do a better grinding job, and they last longer!

Ask a Manhattan abrasive wheel engineer to demonstrate the advantages of Manhattan Moldiscs . . . available in a wide range of types from harder, stiff bonds for roughing—to resilient, flexible bonds for fine finishing.

To get "More Use per Dollar" also on other grinding or cutting jobs . . . specify Manhattan custom made, high speed, heavy duty abrasive wheels.

- FREE CUTTING
- REINFORCED FOR GREATER SAFETY
- WILL NOT LOAD OR GLAZE
- LIGHTWEIGHT, EASY TO CONTROL
- SPECIAL BONDS FOR ROUGHING AND FINISHING

"More Use Per Dollar"

RM848

GRINDING WHEEL INSTITUTE MEMBER

WRITE TO THE ABRASIVE WHEEL DEPARTMENT

MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

RM

Belts • Hose • Roll Covering • Tank Linings • Industrial Rubber Specialties • Abrasive and Diamond Wheels • Brake Blocks and Linings • Clutch Facings • Asbestos Textiles • Mechanical Packings • Engineered Plastics • Sintered Metal Products • Industrial Adhesives • Laundry Pads and Covers • Bowling Balls

miller
WELDERS

BIG TWIN
250 AC/DC

LITTLE TWIN
180 AC/DC

AND BOTH MILLERS ... *Through and Through*

BIG TWIN combination ac-dc welders work from single phase service — deliver new convenience and economy. Two a-c amperage ranges of 20-125 and 60-290 plus two d-c ranges of 18-100 and 65-290 amps master nearly every welding requirement from light gauge metal to structural pieces. Movable shunt type transformer affords infinite current adjustments. Other features include: Horizontal design for easy stacking; weather-resistant construction and Class B insulation; Miller-built semi-metallic rectifier for best d-c welding; high open circuit voltages and new weld stabilizer. This is THE all-time, all-around welder!

LITTLE TWIN ac-dc combination welder has two a-c amperage ranges of 20-115 and 60-180 plus one d-c range of 40-150. Operating from single phase service, this Miller model incorporates many design and construction features usually found only in large industrial types. These include really rugged construction, forced air cooling, new Miller semi-metallic rectifier, movable shunt type current control, new weld stabilizer and open circuit voltage in abundance. Power factor correction is available on both models. Complete specifications on either model will be sent promptly upon request.

miller ELECTRIC MANUFACTURING COMPANY, INC. • APPLETON, WISCONSIN

Distributed in Canada by Canadian Liquid Air Co., Ltd., Montreal

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Speaking of *"Pencils"*...Look what's happened to the TEC Pencil Torch!...

Sounds unbelievable, but TEC'S done it again! Developed an off-set transparent Gas Nozzle and a "non-slip" off-set chuck which converts the famous TEC Pencil Grip Torch into a miniature 300 Amp 45° or 90° Angle Torch in seconds! . . . And WELDS IN 1½ INCHES OF SPACE!

NOW WELD IN NORMALLY INACCESSIBLE AREAS WITH THOSE FAMOUS TEC FEATURES:

"TIP-OF-THE-TORCH" COOLING SO YOU WELD CONTINUOUSLY AT 300 AMPS!
Continuous coolant water reaching the tip of the torch affords cool, continuous welding at 300 amps.

GUARANTEED GAS AND WATER LEAKPROOF!
One-piece unit torch head without threaded fittings or gaskets to wear or leak eliminates gas and water leakage.

UNPARALLELED MANEUVERABILITY!
Lightest weight, only 3 ounces, fine balance and miniature head mean exceptional handling in only 1½ inches of space.

MAINTENANCE ELIMINATED!
Simplicity of design with no moving parts eliminates replacement parts. Quality workmanship assures years of service.

Off-set Nozzle
Off-set Chuck ©
A durable, Vycor nozzle, transparent so you SEE WHAT YOU WELD coupled with an easy adjusting "non-slip" chuck.

SPECIFICATIONS

OVERALL LENGTH— 8¼ in. with 45° Nozzle 8 in. with 90° Nozzle	WORK RANGE— 3 to 300 Amps Continuous Cycle
WORKING WEIGHT— 3 ounces	HANDLE DIAMETER— 1 inch
HOSE LENGTH— 12½ feet	EXTRA LENGTH AVAILABLE 25 feet

NOZZLE SUPPLIED — 45° or 90°, Vycor, 3 in. orfice extension available

©Vycor is a registered tradename of Corning Glassworks, Inc.

Contact your local distributor or write direct:

TEC TEC TORCH COMPANY, INC., CARLSTADT, N. J.
MANUFACTURERS OF VISUWELD EQUIPMENT

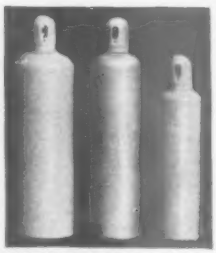
WITH CONTINUED INFLATION AHEAD...

now is the time to invest in the future

PROTECT YOURSELF AGAINST TOMORROW'S HIGHER PRICES by investing *TODAY* in COYNE ACETYLENE CYLINDERS.

Take advantage of today's *lowest* price on COYNE CYLINDERS—and enjoy the reward of a capital investment that appreciates in value over the years.

NOW, is the time to write, or phone (collect) for information on the COYNE all new "92" Acetylene Cylinder.



92% high porosity filler—highest rating in the industry. Stronger steel shell offers virtually "lifetime" service. COYNE ACETYLENE CYLINDERS have greater gas capacity, are faster-selling, and stronger than ordinary cylinders, yet cost no more.

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MATERIAL HANDLING DEVICES

- Safety Factor—5 to 1
- Factory tested at triple rated capacity.
- Will lift from horizontal or vertical position.
- Cam and Pads of case hardened tool steel.
- All operating parts replaceable when worn.
- Swinging or jerking loads will not affect grip.
- Useful for positioning in welding operations.

The HEAVIER the LOAD • • • the TIGHTER the GRIP! 3-T-17

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Welding Engineer

America's pioneer publication which, combined with The Acetylene Journal, has been devoted to the interest of the welding and allied industries since 1898

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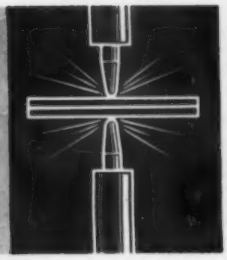
P R MALLORY & CO Inc

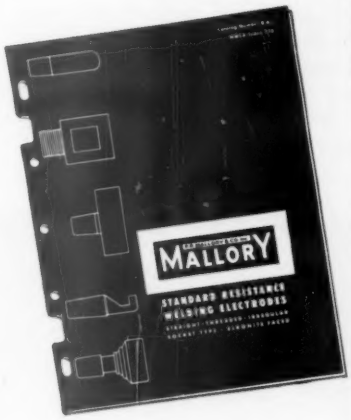
MALLORY MEMOS

NEWS AND TIPS ON RESISTANCE WELDING

P. R. Mallory & Co. Inc., Indianapolis 6, Indiana



WELDING HINTS



What's the best combination of electrodes for spot welding your particular combination of metals? You'll find the answers . . . and a lot of other facts useful to you in the latest Mallory catalog, STANDARD RESISTANCE WELDING ELECTRODES. For example:

Welding *aluminum 2S and magnesium*

Weldability is good when Elkaloy A electrodes are used.

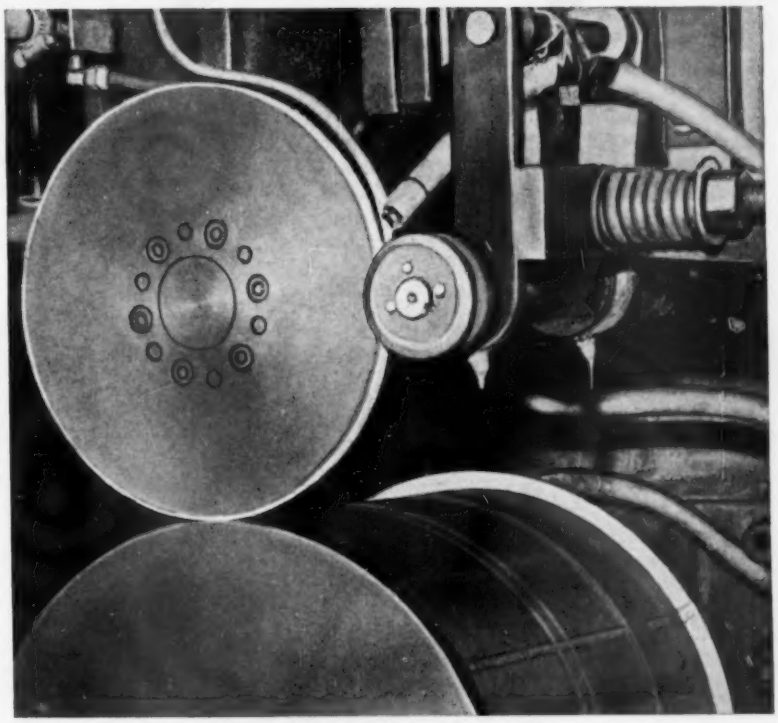
Good weld strength results when welding conditions are accurately controlled.

Welding *Stainless Steel to Stainless Steel*

Use Mallory 100.

Results are excellent; weld strength is good.

A chart in the catalog gives you recommendations for welding over 50 different metals. The catalog also gives properties of Mallory alloys, complete dimensions of various types of standard Mallory electrodes, including irregular welding electrodes. Write for your copy.



Seam Welding Costs Less With MALLORY Wheels

Here's a way to get welding wheels for the right job at the right price. When heavy duty is required, use Mallory cold-forged wheels. They're made through special Mallory forging techniques that give unexcelled uniformity, conductivity and hardness. Produced from a variety of alloys, Mallory cold-forged wheels give consistently fine welds on stainless steel and other special materials and long service between dressings. For less demanding jobs, Mallory offers a line of economy-priced welding wheels. They're constructed of Mallory 3® Metal for top performance.

Both heavy duty and normal duty wheels are available as rough forgings or finish-machined to your specifications.

Mallory welding products are available from authorized distributors located in all principal cities.

How Harry Grieger

Harry F. Grieger is general manager of one of New England's thriving industrial distributing organizations, New Haven's Coe & Brown Company. In the business for more than ten years, Harry Grieger started out with a well-known competitive line of abrasive products and found they just didn't meet his standards. Switching to Bay State, he has built his business rapidly and credits Bay State products and service with a "considerable share in this company's growth."

unclogged a bottleneck at Pioneer Manufacturing

When a company has to work double shifts to keep up with customer demand, it's a pretty sure sign that the company *demands top efficiency* from its suppliers.

That's certainly the case with Pioneer Manufacturing Co., Inc. of New Haven, Conn., manufacturers of engineered sheet metal and welded products. Working with both ferrous and non-ferrous metals, they found that the weld-grinding wheels they'd been using loaded up so fast that the down-time situation was getting out of hand and weld-grinding had become an infuriating bottle-neck.

That was when Pioneer Manufacturing called in Bay State distributor, Harry Grieger, General Manager of Coe & Brown Company. He discovered that the only surprising thing about the situation was how easily it could be solved. He simply specified Bay State's Blue Flash, raised hub disc-wheels and the bottle-neck vanished . . . because Blue Flash wheels cut cost and consistently gave a higher rate of stock removal than any other wheel on the market. As a result, production zoomed, the portable grinder operators were delighted and the customer was more than slightly pleased with the improvement in the company's profit picture.

Like Harry Grieger, the Bay State distributor in your area is a trained abrasive specialist. He's as glad to tackle tough problems as he is simple ones and you'll find he's a mine of ideas on ways to improve grinding technique and cut abrasive costs . . . because *better grinding at lower cost, that is his business.*

BUY THROUGH YOUR INDUSTRIAL SUPPLY DISTRIBUTOR

Operator Lawrence Jennette grinds weld bead on steel brace for frame of vibration test equipment, designed for aircraft and missile manufacturers *(guard removed for photography).*

BAY STATE ABRASIVES

BAY STATE WHEELS of PROGRESS

Bay State Abrasive Products Co., Westboro, Massachusetts.
In Canada: Bay State Abrasive Products Co., (Canada) Ltd., Brantford, Ontario.
Branch Offices: Bristol, Conn., Chicago, Cleveland, Detroit, Pittsburgh, Los Angeles. *Distributors:* All principal cities.

Medium Frequency (1200 TO 12,000 CYCLES) Induction Heating Equipment for Stress Relieving

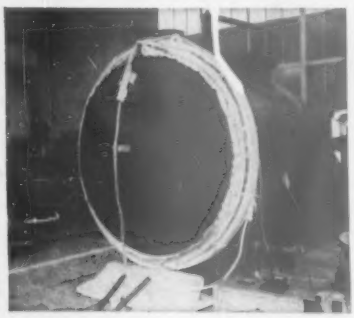
By Werner K. Haessler, Project Engineer, Brown Boveri Corp.

BROWN BOVERI

Brown Boveri manufactures turbine and generator shafts, precision marine gears and other products requiring flawless, stress-free weldments. After thorough testing, the Company adopted medium-frequency induction heating for stress relieving of weldments and for shrink fitting. Compact, mobile power-converters and special heat-resistant, insulated cable were developed . . . adding speed and flexibility to induction heating techniques. Standard sets are now available.

Advantages

Induction heating offers complete mobility not possible with furnaces. Even assembly welds at a customer's



Cable arrangement for stress relief treatment of welded flange. Diam. 80", thickness ⅝", max. temp. 1148°F. Maximum power: 60 kw at 2.4 kc/s.

plant can be heat-treated. It generates the heat *inside* the metal as compared to furnaces or resistance heaters that heat from the *outside* using high surface temperatures. Thermocouple control allows more accurate adherence to prescribed temperature gradients. Simple cable and insulation arrangements cut labor cost. Cables and work can be covered with asbestos blankets to minimize radiation losses.

Medium frequency induction heating allows the use of relatively short and light cables with longer cable life. Since only a few turns are required, the energy is concentrated at the welding area allowing substantial power savings. The medium frequency system is adaptable for workpieces from 1/32" thick up to heavy forgings. (Low frequency systems, 50 to

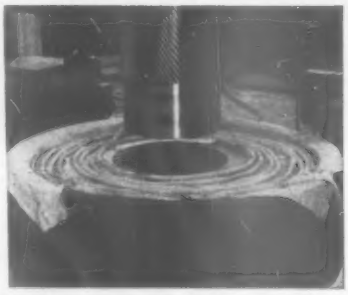
Mobile truck for 38 to 110 kw output units. Larger units are also on a mobile chassis. Automatic temperature sequence control. Graph shows record of complete sequence.

400 cycles, require thick or very long cables and are limited to heating thick, heavy sections.)

Brown Boveri medium frequency converter sets

Frequency kc/s	Power kw	Voltage v	Input* kva
1.2	60	360	90
1.2	110	630	155
1.2	165	720	230
1.2	220	900	300
2.4	50	400	72
2.4	66	540	95
2.4	88	720	127
2.4	130	720	190
2.4	185	900	260
4.8	38	600	60
4.8	55	800	83
4.8	77	540	115
12	44	650	65
12	66	450	95

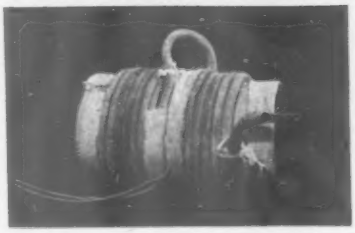
*3-phase motor input at 220, 440 or 500v, 60c.



Shrinking a gear wheel onto a shaft. The insulating blanket covering the cable has been removed to show the cable arrangement.

All sets are complete on a mobile, 4-wheel chassis. Plug and socket connections are supplied for connecting 2 similar sets in parallel for higher power. Drip-proof housing for outdoor exposure. Power and heat controls provide accurate, automatic heating, soaking and cooling periods with no supervision.

The complete range of Brown Boveri stress relieving units makes it possible to provide the frequency best suited for the specific size, thickness, composition and shape of the workpieces to be treated. In general, the lighter the workpiece, the higher the frequency. Experience has proved, however, that if one machine is to be used for a variety of applications, frequencies in the range of 2 to 2.5 kc are the most suitable.



Upper photo: Cable position during pre-heating at 850°F and welding. Below: Cable windings are simply pushed together and are ready for stress relief treatment up to 1250°F.

Brown Boveri Induction Cable

Highly flexible, heat-resistant. For work temperatures up to 1250°F without water cooling. Can be used for preheating then stress relieving without removal during welding. Bends to radii of 2" or less for easy application to the work. Supplied in easy-to-handle sections of 15 to 50 ft. quickly connected during application. Insulated for 1000v.

Write for complete details and Cost Estimate Questionnaire.

BROWN BOVERI

U. S. Sales and Engineering: Brown Boveri Corp., Dept WE 12, 19 Rector Street, New York 6, N. Y. Agents in 27 U. S. cities.

BETWEEN PASSES

training in USSR

Regular readers of WELDING ENGINEER are well aware of our oft-repeated editorial stand on the need for more and better-trained welding engineers. Now comes along a Russian publication with the same plaint.

An editorial in a recent issue of "Welding Production" states that "The number of student welding engineers is a matter for serious consideration. They are entirely inadequate in number and do not satisfy the needs of the country. More higher education institutes are needed, with evening classes in special welding subjects, and their laboratory facilities must be increased. . . . In most higher education institutes, which now have special welding departments, the welding training is unsatisfactory."

This from a nation that claims it ". . . was the first country to organize the training of welding engineers."

The editorial will be discussed further next month.

Yuletide

The poem reproduced below was written many years ago by the late J. B. Green, founder and president Chicago Steel & Wire Co. It is reprinted with permission.

The Weldor of Souls

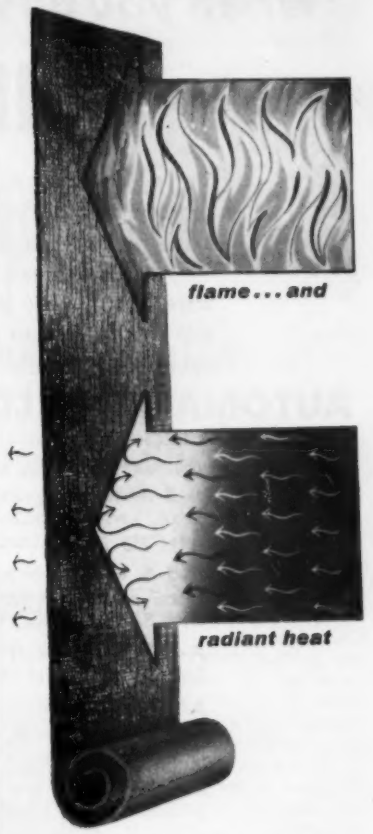
The season's strife has come and gone,
Yea, many it has torn.
The fight has cracked the souls of men.
And some are warped and worn,
While Greed and Spite and Fear and Hate
Corrode and eat clear through.
But there comes a time when a Mender of men
Makes all men's souls like new.

Weldor of Souls, He strikes His arc,
His torch, His helpers light
And bring the broken souls to mend
Atrembling, weak with fright.
He cuts away a spot of hate
Corroded deep within,
But the gap is closed with an alloy of love.
A soul stands free of sin!

Another soul is broken bits;
It hoped and hoped in vain.
The Weldor deftly plies his trade.
The man's a man again!
Some souls are worn by battle hard,
And added strength they need,
But He builds them strong, does the Weldor of souls,
As bead He lays on bead.

A guiding star, the Weldor's arc,
His torch, a flaming guide,
As pitted, broken, fight-worn souls
Come in from far and wide.
Untiring toil! He shuns all rest
To finish ere the day
When "Peace on Earth, Good Will Toward Men"
O'er all the world holds sway.

NOW CONTROL BOTH



...with new J-M
Aluminized
Asbestos Cloth

AN economical and easily worked combination of aluminum foil with asbestos fabric, J-M *Aluminized* Asbestos Cloth provides heat and flame resistance which exceeds that of either of the materials used alone.

The *aluminum* foil helps reflect 90% of all radiant heat—the major cause of worker discomfort, fatigue and inefficiency. The fireproof *asbestos* supplies flame-resistant sturdiness. In combination, the aluminized asbestos cloth retains great strength, even after long exposure to temperatures to 1400°F.

For data on J-M Aluminized Asbestos Cloth for curtains, shields, blankets, hoods, and other needs—write Johns-Manville, Box 14, New York 16, N. Y. In Canada, Port Credit, Ontario.

JM PRODUCT

JOHNS-MANVILLE

When you buy welding wire from PAGE,

you get— THE RIGHT WELDING WIRE,

• The only *sure* way to get a dependable weld—a non-porous weld, free from cracking—is to use a welding wire which will give weld metal compatible with the base metal, and which contains deoxidizers designed to eliminate all impurities.

PAGE has had more than 50 years of experience in the development of welding wires for specific jobs. As a result, you can get the wire best suited to your welding job—and you can get it from local stocks, packaged in the way that fits your own production requirements.

AUTOMATIC WELDING WIRE

A choice of 33 analyses of automatic welding wire enables you to get the *exact* wire you need for any welding operation. Here are some examples:

A-S-Armco • a pure iron for welding "Armco Iron," which contains other elements in a quantity guaranteed to be less than 0.1%.

A-S-6 • for welding mild steel with exceptional ductility—50,000 p.s.i. average tensile, with 35% elongation.

A-S-10 • a low-carbon mild steel, chiefly used for submerged arc welding.

A-S-15 • an aluminum-killed mild steel which gives a tensile strength of approximately 75,000 p.s.i. with 40% elongation.

A-S-16 • the same as A-S-15, but with molybdenum added for higher tensile strength.

A-S-17 • a modification of A-S-10 with silicon added for use with inert gas.

A-S-18 • the first successful wire for CO_2 welding of high-carbon and sulfur-bearing steels and for general use on low alloys.

A-S-20 • a high-tensile submerged arc rod, also suitable for CO_2 welding.

A-S-25 • a modification of A-S-20, with deoxidizing agents added for better CO_2 welding.

A-S-30 • produces porous-free weld metal, even on a very dirty steel. Contains up to .75% aluminum for maximum deoxidation.

A-S-65 • reasonably priced for hard-facing with high resistance to abrasion or erosion.

A-S-4130 • a medium carbon, chrome-molybdenum alloy for welding the SAE 4100 series of low alloys.

A-S-6150 • a low alloy hard-facing rod, producing a Rockwell hardness of C-32 which can be machined or ground.

A-S-8620 • contains chromium, nickel and molybdenum, and can be used with any low alloy containing any or all of these metals, even when the exact analysis is not known.

A-S-Stainless • several stainless wires are available to match the various grades of stainless steel.

METAL SPRAY WIRE

Metal spray wires generally deposit a coating of the same analysis as the wire employed, and this deposit may be built up to any thickness. The deposit is porous and has little tensile strength, but provides excellent anti-frictional characteristics and resistance to abrasive wear.

BARE and SULCOATED ELECTRODES

PAGE electrodes are available for use with Armco, mild steel, low alloy and heat-treatable steels, and for impact-resistance surfacing.

GAS WELDING RODS

PAGE gas welding rods are available in any of the analyses for welding wires. Any welding wire grades listed can be furnished in 36″ straight lengths for gas welding rods. Rods also can be furnished in coils and on reels.

PAGE

WHEN YOU NEED IT, PACKAGED THE WAY YOU WANT

NATIONWIDE DISTRIBUTION and WAREHOUSING

PAGE welding wire, rods, and electrodes are as close as your phone. Prompt delivery is assured from a coast-to-coast network of PAGE distributors backed up by strategically located warehouses.

LET PAGE HELP YOU SOLVE YOUR WELDING PROBLEMS

From our 33 analyses, we usually can prescribe the wire best suited to your requirements. We also can develop special wires when needed to solve a particularly tough welding problem. At all times, PAGE welding specialists are ready to give expert advice. Call on us for help.

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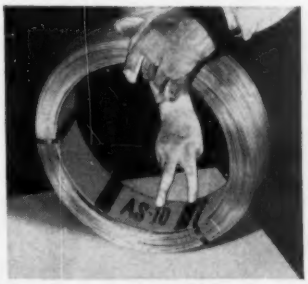
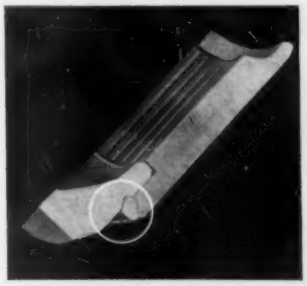
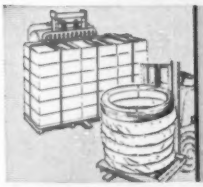




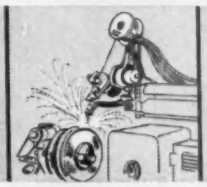
Perfect weld of SAE 1141 to SAE 1151 was accomplished with A-S-18, using CO_2, to form an automotive drive shaft. Note clean metal in cutaway portion shown at left. There's no annealing of the high-carbon resulfurized steels, because preheat and post-heat are not required.

PACKAGING TO MEET YOUR REQUIREMENTS



25-lb. or 60-lb. coils, single or palletized—also in single or palletized individual cartons, or in waterproof reusable fiber-board drums.

120-lb. or 180-lb. coils, paper-and-burlap wrapped, or in palletized cartons. Special coil sizes on application.



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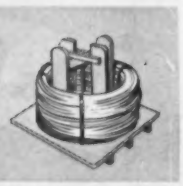

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Folder DH-1218 Chart lists detailed analyses of PAGE automatic welding wires, metal spray wires, bare electrodes and gas welding rods. Shows uses and properties. Lists most competitive makes.

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MILWAUKEE 46, WISCONSIN

DECEMBER, 1959

Welding Engineer

ESTABLISHED 1916

Knowing vs. Doing

THROUGH TRIAL AND ERROR during their many years of use, welding and cutting operations have reached a point of basic safety—*but they are not nearly as safe as they might be if personnel and management would observe ALL the necessary precautions dictated by these modern joining and severing methods.*

A recent news item stated: "A stubborn fire in bales of textiles and cardboard boxes reportedly set off by welding sparks felled 10 firemen, tied up downtown traffic for hours and sent huge clouds of smoke billowing over lower Manhattan." Thirty pieces of fire apparatus and 175 firemen were called to the scene—all a result of "careless use of welding equipment" by two weldors.

Undoubtedly, most contributors to the fire hazards of open flame and welding sparks are just thoughtless; they fall into the same category as the fellow who smokes in bed.

Both of them *know* the potential dangers of their actions, and they *know* what precautions should be taken. *But knowing and doing are two separate activities.* Thus, the careless smoker or weldor may cause extensive damage, though possibly escaping with his own life. In any case, it's a foolish game to be playing.

We know welding and cutting operations are safe, provided ordinary safety precautions are taken. These safety rules have been published on this and other pages of WELDING ENGINEER on numerous occasions. We could republish these rules again, but it is our hope that the weldor's good judgment will guide him.

We believe all people working with a welding torch or arc realize that where there are flames and sparks, there is a fire hazard. Therefore, in this special issue we want to take a different tack—*why* these safety rules are necessary.

If we know the why's, perhaps we can eliminate all welding fires.

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RODS FOR MANUAL APPLICATION

This Hardfacing Rod	For These Conditions	This Equipment or use	How Applied
VICTORTUBE (Tungsten Carbide)	Severest abrasion	Earth cutting, scraping, drilling tools, rippers, augers, ditchers, excavators, loaders	Gas AC-DC Arc
VICTORTUBE (TC) Bare 30-Down	Severest abrasion; moderate impact	Agricultural and earthworking tools. Suitable for acetylene application	Gas only
VICTORTUBE "SPECIAL" (Tungsten Carbide)	Severe abrasion with impact	Oil field tools - rock bits, drag bits, reamers; water well drilling tools	Gas only
VICTOR TUNGSMOOTH (Tungsten Carbide)	Maximum abrasion	Edged cutting tools - bits, blades, farm tools. Smooth, thin deposits on augers, screw flights, paddles.	Gas AC-DC Arc
VICTORITE	High abrasion; sliding friction	Earthmoving and agricultural tools, brick augers, conveyors, mill guides	Gas AC-DC Arc
TUBE VICTORITE	Abrasion and impact	Farm tools, crushers, grinders, mixers, scrapers, fan and screw conveyors	Gas AC-DC Arc
VICTORITE 1	Heat; abrasion, corrosion	Chemical & food machinery, cement pumps, brick dies, dry bearings & journals, expellers	Gas AC-DC Arc
VICTORITE 6	Heat; impact; corrosion; abrasion	Hot dies, stripper bits, exhaust valves & seats, dry bearings & journals, edging rolls, cams	Gas AC-DC Arc
VICTORITE 12	Heat; corrosion; abrasion; impact	Saw-blade inserts, shaft bearings, hot punches, flapper valves, needle valves	Gas AC-DC Arc
VICTORITE CARBON ARC	High abrasion; sliding friction	Farm tools, earth abrasion. Applied by gas. Deposits are exceptionally smooth.	Carbon Arc Gas
VICTORITE Plow Point Bar	High abrasion; sliding friction	Cast-to-shape, weld-on cutting edge for plow shares, digger teeth, pilot bits	Gas
VICTORALLOY	Severe impact; abrasion	Crusher & dredge parts, tamper feet, bucket teeth. A tough low-cost hardfacing.	Gas AC-DC Arc
VICTORALLOY #1	High abrasion; medium impact	Crushers, bucket lips & teeth, muller tires, dozer blades, dredge pumps	Gas AC-DC Arc
VICTORALLOY "A"	Angular shock; extreme impact	Clutch parts, gears, latches, pins & keepers; build-up for hardfacing	AC-DC Arc only
VICTORALLOY "B"	Heavy impact; moderate abrasion	Tractor idlers, sprockets, rolls, crusher parts, pump casings, impellers, liners	AC-DC Arc only
VICTORALLOY "C"	High abrasion; moderate impact	Cement screws, gudgeons, drag chains, pressure rolls, mixer blades & paddles	AC-DC Arc only
VICTOR MULTI-PASS (for Build-Up)	Severe impact; compression	Drill tools, crawler pads, crushers, mine rails; build-up for hardfacing	AC-DC Arc only
VICTOR Ni-Mn (for Build-Up)	Severe impact; compression	Hardmetal underbase for manganese steel parts on crushers, dredges, dippers	AC-DC Arc only
VICTOR Ni-Mn (for Attachment)	Severe impact	A low-cost "stainless" joining rod for crushers, dippers, crawlers, dredges	AC-DC Arc only

WIRES FOR AUTOMATIC & SEMI-AUTOMATIC APPLICATION

This Wire	For These Conditions	This equipment or use
VA O	Severe abrasion; moderate impact	Crushers of all types, tool joints, mullers
VA 1X	Abrasion & compression with impact	Scrapers, bucket teeth, crushers
VA 2X	Severe compression & impact with abrasion	Steel mill rolls, dredge rolls, cable sheaves
VA 3	Severe abrasion & compression with impact	Mill guides, crushers, grinders
VA 4X	Severe impact & compression	Build-up on trunnions, tractor idlers & tracks
VA 5X	Severe metal-to-metal impact & abrasion	Shovel rollers, tractor rollers & idlers
VA 6X	Severe impact, high temp., dry bearing	Steel mill rolls, clutches, roll necks
VA 7X	Severe impact & compression with abrasion	Build-up on mine car wheels & tractor rollers
VA 8X	Earthworking abrasion & impact	Dozer blades, scraper blades, tool joints
VA 10	Extremely severe abrasion; moderate impact	Tool joints, crushers, scrapers, swing hammers
VT 60 (Tungsten Carbide)	Maximum abrasion; earth cutting, scraping	Tool joints, scraper blades, augers
Ni-Mn (Hadfield)	Wear, all types manganese steels	Build-up manganese steel parts for overlay or to size

Welding Engineer

Welding safety "why's"

STOP, LOOK, . . . AND READ

SAFETY PRECAUTIONS have been in effect ever since the first caveman put his hands over his head as protection against his coconut-wielding, non-evolutionized ancestors still in the trees.

Since that time, the world (both socially and industrially) has become more complicated—and keeping pace, safety devices have become more sophisticated.

Helmets, lenses, goggles, respirators, gloves, aprons, leggings and shoes are just some examples of this progress. Unfortunately, the attitude toward their use has not evolved as rapidly.

We have a distinct advantage over the first caveman. We can learn from the mistakes of others; he had to learn the hard way. But there is a huge void between *knowing* a safety procedure and *applying* it to everyday welding and cutting operations.

To bridge this gap, it is necessary to know the "why's" of the various safety devices, precautions and rulings collected, tested and promulgated by the numerous agencies and manufacturers concerned. By presenting a few of these "why's," *WE* hopes to lay a foundation for that bridge between knowing and doing.

The main hazards to which a weldor is usually exposed are: electric shock and burns; radiant energy; gases, fumes and dust.

1. Electric shock—Whenever any part of the body becomes a part of an electrical circuit, injuries may result from nerve shock, burns or both. Even a slight electric shock, harmless in itself, may cause the victim to fall, and possibly result in severe injury.

The extent of electric shock injury depends on voltage and circuit resistance. Arc welding voltages are low—and therefore invite careless handling.

SCARFING, with its shower of sparks, is an impressive sight, but the operator here is more impressed with safety, viz., helmet, gloves, leggings, etc.

But remember, even low voltages may, under certain circumstances, be dangerous, *e.g.*, when air temperature and humidity are high; when the weldor's skin is moist, or his clothing is damp; or when he is standing on a wet floor. Resistance is also influenced by the type of shoes and gloves worn.

The weldor is safe only as long as he keeps his body well insulated from work, electrode and holder. Dry protective clothing, proper gloves, consistant use of electrode holders, and insulation from grounded surfaces are essential safeguards against electrical injuries.

Should a worker receive an electric shock, steps should be taken to restore normal breathing as soon as the contact is broken or the victim freed from the live conductor. If he has stopped breathing, or is only breathing irregularly and poorly, artificial respiration should be started without delay, and continued for as long as necessary.

Remember, also, that the victim of shock loses body heat rapidly. Therefore, blankets or other coverings should be used to keep him comfortably warm to conserve body heat.

Inhaling of aromatic spirits of ammonia is permissible while applying artificial respiration, but absolutely nothing must be given by mouth as long as he is unconscious. Administration of drugs is best left to the doctor's discretion.

2. Burns—Although burns may accompany electric shock, they may also be received from arc heat when no shock is involved. Painful burns may occur from gas-welding flames, hot metal particles or welded parts handled before they are cooled.

A surface burn may be small at the point of contact, but destruction of the underlying tissue may involve an extensive area. Emergency treatment consists of dressing the injury to relieve pain and prevent any possible infection.

All clothing covering the burned area should be carefully removed. Clothing which sticks to the burned skin should not be pulled off. Cut around the part that sticks and leave its removal for the doctor. The burned surfaces should be covered with a smooth, thick layer of sterile gauze and a gauze or muslin bandage applied firmly over the dressing.

In any case of electrical shock or severe burns, a doctor should be called immediately, or the patient removed to a hospital as soon as the above first aid is completed.

3. Radiant energy—Ultraviolet and infrared rays, although invisible, are very active and powerful, and usually present where there is a high-heat radiation.

Molten metal, an oxy-fuel flame, and even more so, the welding arc, give off quantities of these rays; molten metal emitting largely infrared, while an arc emits mostly ultraviolet rays. In inert-gas welding, highly intense ultraviolet rays are given off.

Protection against these rays is necessary because:

(a) Ultraviolet rays cause a photochemical reaction and may result in painful irritation of the eyes on slight exposure (sometimes at a distance from the source). So far as is known, exposure to this ray does not cause permanent eye injury. However, in high intensities, they may also affect the skin, causing a reddening and burning sensation similar to sunburn.

(b) Infrared rays act on the eyes as simple heat, and can cause a real burn or irritation of the eye tissues.

(c) Excessive visible radiation must also be guarded against during welding since the resulting glare will cause headaches, eye fatigue and loss in visual efficiency.

Fortunately, eyes can be protected against all harmful radiation. Color shades for filter glasses recommended for the different welding or cutting operations are listed in the AWS standard *Safety in welding and cutting*, and shown in table 1.

Goggles should fit comfortably and have no edges which might irritate or cut facial skin. Persons who wear corrective glasses must have the protective lenses worn over these glasses arranged so that the optical adjustment is not disturbed.

Ordinary clear glass and tinted goggles will provide enough protection against stray light waves for those working around but not very close to welding operations. Distance at which stray light waves cease to be an eye hazard has never been precisely determined; it is a function of ray intensity and duration.

For gas welding and light arc welding operations, 25 or 30 ft would be a safe distance without protection. However, eye protection will be necessary according to the amount of exposure for heavier welding at distances up to 100 ft.

4. Gases, fumes and dust—Phosgene, a highly toxic gas, is a result of trichloroethylene being decomposed by heat, or even by ultraviolet rays. All metal parts should therefore be thoroughly decontaminated before welding.

Other injurious gases produced by the welding arc or flame are nitrous gases, ozone and carbon monoxide. (Oxygen and nitrogen passing through an arc combine to form nitrogen oxides and ozone. Incomplete combustion of any carbon-containing material produces carbon monoxide.)

Generally, welding does not involve continuous exposure to these gases unless done by automatic welding machines, and a weldor is not engaged in actual operation of the equipment more than half the time.

Color shades for welding, cutting

Manual metal arc 1/16, 3/32, 1/8, 5/32 in. electrodes	10
Manual metal arc 3/16, 7/32, 1/4 in. electrodes	12
5/16, 3/8 in. electrodes	14
Mig welding (nonferrous)	11
Mig welding (ferrous)	12
Atomic hydrogen welding	10-14
Carbon arc	14
Soldering	2
Torch brazing	3 or 4
Light cutting, up to 1 in.	3 or 4
Medium cutting, 1 to 6 in.	4 or 5
Heavy cutting, 6 in. and over	5 or 6
Gas welding (light) up to 1/8 in.	4 or 5
Gas welding (medium) 1/8 to 1/2 in.	5 or 6
Gas welding (heavy) 1/2 in. and over	6 or 8

Note: in gas welding or oxygen cutting where the torch produces a high yellow light, it is desirable to use a filter or lens that absorbs the yellow or sodium line in the visible light of the operation.

TABLE I—Color shades for filter glasses as recommended by the AWS safety standard for different welding and cutting operations.

The most common nitrogen oxide gases (which all have a sweetish odor) are: nitrous oxide, an anesthetic gas which has no particularly irritating effects in the presence of sufficient oxygen; nitric oxide, which in the presence of moisture and oxygen converts into nitrogen dioxide; and nitrogen dioxide in two unbreathable, highly-irritating forms.

A toxic concentration of these gaseous oxides may be either dark brown or colorless. However, color intensity is not in itself an indication of the degree of danger. Maximum concentration of nitrogen oxides permissible is about 25 parts per million when exposure is prolonged. A limit of 5 parts per million has been recommended for nitrogen dioxide.

Tests on an arc welding operation in an open room recovered appreciable amounts of nitric oxide in the arc vicinity, but not in concentrations high enough to be dangerous.

On the other hand, tests made on an oxyacetylene welding operation yielded nitrous fumes in such small quantities that evidence was not conclusive. Therefore, it is thought that under ordinary conditions of gas welding, these fumes do not occur in sufficient amounts to be a hazard.

Nitrous gases are the most dangerous of all irritant gases because their effect—difficulty in breathing—seems mild at first, and the victim may think himself unharmed after being revived. However, rapidly fatal lung congestion may appear from 6 to 24 hours after exposure.

Emergency treatment for nitrous fume poisoning is immediate removal to fresh air and absolute rest. Unless breathing has stopped, artificial respiration is not advisable since it may cause fluid in the lungs. A doctor should be called at once.

Ozone, a gaseous oxygen with an intense piercing odor, is produced by almost every electric arc, including short wave-length ultraviolet rays. Because of its immediate effect on the mucous membranes of the respiratory tracts, it is classified as an irritant.

Although ozone has no cumulative effects, exposure to high concentrations may cause severe shortness of breath, lung irritations resulting in lung fluid, and even possibly death.

A limit of 0.1 part per million has been recently recommended. However, studies have shown that under usual conditions with proper ventilation, high concentrations of ozone are not encountered.

Carbon monoxide and carbon dioxide are colorless, practically odorless gases. Carbon dioxide is merely a respiratory stimulant and, except in high concentrations, seldom has harmful effects if combined with sufficient oxygen.

Carbon monoxide, on the other hand, is an extremely dangerous internal chemical asphyxiant which combines with the red coloring matter of the blood cells, preventing oxygen from being carried to the body cells by the blood, thus causing death. Maximum allowable concentration for a continuous eight hour exposure is 100 parts per million.

Since it is invisible and odorless, a victim can be overcome without warning, and if not removed from the gas immediately after exposure to high concentration, he will die of internal asphyxiation.

When 60% of the blood combines with carbon monoxide, unconsciousness results. A saturation of 80% is rapidly fatal; more than 80% is immediately fatal. The effects, therefore, depend on two factors: length of exposure, and concentration of the gas in the air breathed.

Essential first aid treatment for this poisoning is removal to fresh air and manual artificial respiration combined with oxygen inhalation.

For practical purposes in general

WELDING in a confined space is where an air-mask is both most inconvenient and most important. This welder is taking a chance by not having any adequate means of ventilation to dissipate the fumes.

welding, adequate natural or mechanical ventilation should be furnished, while local exhaust and ventilation or individual respiratory equipment should be provided for welding in confined spaces.

When welding, metallic oxides commonly given off as fumes or dust, may originate from several sources: materials being welded, coatings on the substances being welded or cut, coverings of electrodes used in arc welding, or from the flux.

The more important of these, the fumes of which may produce health hazards in confined spaces, are: lead zinc, brass, bronze, cadmium, beryllium, fluoride, chrome, manganese.

In open-air welding or in large, well-ventilated repair shops, hazards from atmospheric contaminants are usually negligible, particularly if welding is done only intermittently. But when welding is performed on a production basis in inadequately ventilated spaces, the respiratory risks may become serious.

The accumulation of toxic substances in fixed welding operations, (*e.g.*, welding booths), can be prevented by lateral or down-draft ventilation at the work bench; by use of exhaust fans, or by readily movable hoods located close to the welding operation. Openings at the top and bottom of the booth will allow free circulation of air.

MANUAL arc welding demands a color shade for filter glasses. Shade numbers, depending on the electrode size, range from 10 to 14. Note the weldor is also wearing gloves and overalls.

Ventilation Rates

Welding zone: in. from arc or torch	Min. air flow cu ft/min	Duct diameter in inches
4 to 6	150	3
6 to 8	275	3½
8 to 10	425	4½
10 to 12	600	5½

(1) Wherever possible all exhaust from operations should be discharged to the outdoors.
(2) Minimum air flow should be increased by 20% for hoods not provided with flanges.

TABLE 2—Ventilation rates for velocity control using a 3-in.-wide flanged suction opening.

Local exhaust ventilation for permanent welding stations can be provided by flexible metal tubes 3 or 4 in. in diameter extending from an overhead main exhaust duct to the welding benches. The tubes should be supported by jointed and counterweighted arms so that intake ends are readily maneuverable.

The effectiveness of either a hood device or a flexible metal tube in removing air contaminants at their source depends on two important factors: *(1)* the quantity of air to be exhausted from each welding operation, and *(2)* the nearness of the exhaust opening to the point of welding. The required quantity of air varies with the distance of the exhaust opening from the welding zone.

The AWS safety standard states that mechanical ventilaton must be provided *(a)* in a space of less than 10,000 cu ft per weldor; *(b)* in a room having a ceiling height of less than 16 ft; and *(c)* in a confined space or where welding space contains partitions, balconies or other structural barriers which significantly obstruct cross-ventilation.

The standard further states that ventilation be at a minimum rate of 2,000 cu ft per minute per weldor except where local exhaust hoods, booths or airline respirators are provided. Natural ventilation is considered sufficient for welding or cutting operations where the space restrictions listed above are not present.

Freely movable hoods are one means of mechanical local exhaust ventilation. These hoods are to be placed as close as practicable to the work being welded, with an air flow rate sufficient to maintain a velocity of 100 linear ft per minute when the hood is at its farthest point from the welding zone.

Rates of ventilation required for this control velocity using a 3-in.-wide flanged suction opening are shown in table 2.

Another means of mechanical local exhaust ventilation is a fixed enclosure with a top and not less than two sides which surround the welding or cutting operation. The air flow rate must be enough to maintain a velocity of not less than 50 linear ft per minute away from the weldor.

Where maintenance welding is done in any tank, boiler or other inadequately ventilated, confined space, and where local exhaust ventilation is not possible, the weldor and his fellow-workers should have appropriate respirators.

Although these confined spaces are the places where an air-mask is most inconvenient, it is essential for the weldor to wear either a hose-mask or supplied-air respirator. Other workers should wear appropriate chemical cartridge respirators if their exposure is not severe.

Since the air for airline respirators is usually supplied from a high pressure compressed-air system, it must be checked before use to make certain no harmful contaminations are present. Oil mists, odors, dust from rust and carbon monoxide may be present if the compressor becomes overheated.

It is equally important to supply a continuous flow of air, since there is no reserve supply should the air flow fail.

Workers required to wear respirators should be provided with the proper device, instructed in its use, and given a clean, well-maintained respirator for each shift.

Welding Engineer *a special report*

Leather shortages causing higher garment, glove prices

IF CURRENT SHORTAGES continue, you can expect to pay more for weldors' leathers and gloves within the next few months.

This is the opinion of 70% of the respondents in the latest survey conducted by WELDING ENGINEER's Research Dept. among leading manufacturers. The anticipated price increases varied from 5 to 25%.

Main reason for this projected price hike: lack of leather.

According to industry reports, shoe manufacturers, reluctant to pay the steadily (since August, 1958) rising price of calf-skin and other high-cost leathers, are turning more to glove leathers.

A tight market has resulted, with not only higher prices (more than 170% higher than last year and highest since 1951), but short supply as well. This market condition was first reported in the June WELDING ENGINEER, and since then has not been alleviated.

According to one glove manufacturer contacted in the survey: "It is exceptionally difficult to get leather, and the quality has degenerated appreciably this year."

More than half of the manufacturers surveyed stated cowhide was the most difficult to obtain, with horsehide and carpincho running close behind in the second and third positions of importance.

Another manufacturer stated: "The shoe industry in this country has entered what has normally been considered a glove leather market . . . they are currently using these leathers in shoes, and are willing to pay a much higher price to the tanners in order to get the leather."

The tanners in turn are hamstrung by low inventories because of reduced cattle slaughter. And looking to the foreign leather markets, (*e.g.*, Argentina), is no help. *Leather and Shoes* magazine, quoting U. S. officials in Buenos Aires, reported that Argentine leather tanners have faced price increases of 600% in the past year for raw stock.

In line with the general market condition detailed above, all the manufacturers contacted by *WE* reported leather cost increases during the past six months ranging from 15 to 20 cents per square foot, with one manufacturer reporting an increase of 300%. Half of the respondents anticipated further cost increases of 2 to 4 cents in the near future.

Keeping pace with the leather costs, the price of weldors' leathers and gloves have also increased in the past six months; weldors' leathers from 18 to 140%, gloves from 25 to 107%.

Imported hides were considered a factor in the garment and glove field by half of the manufacturers surveyed and these singled out deer skin, goat skin, carpincho and cowhide. There was general disagreement, however, on whether imports are increasing or decreasing, and they split 50-50 on the question of imported hides being less costly.

The survey showed one area of unanimous accord: the leather-like plastics do not offer possibilities as leather substitutes for weldors' leathers and gloves.

In a special series of questions, the manufacturers were asked what they considered the lowest possible retail price for a weldor's glove that is expected to give a reasonably satisfactory service life. Their answers ranged from a low of $1.75 to a high of $3.50.

A follow-up question dealt with the expected service life of a pair of weldor's gloves under normal wear and tear. Half of the respondents stated glove life depended on the particular job on which the gloves were to be used.

The remaining 50% claimed a service life of two to six weeks, and these all agreed that this time period was applicable to the specifically priced gloves they had mentioned in the previous question.

The survey uncovered two interesting points of marketing psychology. According to these manufacturers, there seems to be a trend developing in which private brands will become more popular. The second point is a preference for grey over brown as a garment color.

In the final segment of the survey, the manufacturers were asked for their educated guesses on the total number of specific items sold each year by all manufacturers. The results, in dozens, were:

Overalls	500
Jackets	5,000
Capes	15,000
Sleeves	5,000
Gloves	more than 100,000

Who *WE* asked

This special report on weldors' leathers and gloves is a result of the answers submitted by several major manufacturers: Advance Glove Manufacturing Co., Elliot Glove Co., Inc., Racine Glove Co., Safety Clothing & Equipment Co., John Tillman & Co., and 20th Century Glove Corp.

New products . . . . . designed for SAFETY

Plate retainer

Back plate loading is advantage of new stationary front plate retainer of line of fibre and fibreglass welding helmets. Feature is made possible by use of newly developed plate holding springs. An extra large plate holding area is claimed for new retainer, with plenty of room for cover plates, welding and safety plates and a magnifier for bifocal wearers. Nylon plastic used in construction protects against electrical conductivity. *Sellstrom Mfg. Co.*

Circle No. 1

Safety glasses

Universal fitting, spatula type, patented Retrax temples are now available on new Rapido line of custom-fit frames. These new temples supplement standard smooth hook Retrax temples to satisfy style requirements, eliminate fitting problems and reduce inventory by making it unnecessary to stock a number of sizes. Wearer simply slides spatula ear piece in or out of temple member for a comfortable fit. Special design of piece gives no-pressure grip behind ear. Ear pieces are of transparent pink plastic and are available with pink, bronze, copper, maroon, blue-gray or green temples and frames. Side shields are also available. *Watchemoket Optical Co., Inc.*

Circle No. 2

Sleeves and aprons

Protective sleeves and aprons come in all sizes and materials for various industrial applications. Materials include asbestos, chrome-tanned leather, fireproofed duck, vinyl-coated fibre glass, and oil-chem plastic. *Safety Clothing and Equipment Co.*

Circle No. 3

Safety lenses

A new heat treating process makes lenses of any color especially resistant to impact. The treated lenses look no different than others, but are slightly thicker. No special frames are needed, but manufacturer recommends metal or plastic for strength. All lenses are tested by dropping a ⅞-in. steel ball from more than a 4-ft height. Treating is done by heating lens, and just before it softens and changes shape, cooling by a blast of air. *Bausch & Lomb Co.*

Circle No. 4

Safety goggles

Savue safety goggles form a cushioned closure around the face and are designed to prevent flying particles from getting under the lens. Shatterproof lens is made to insure optical clarity and provides undistorted vision for a full 180 deg. Maximum protection against splashing of irritating liquids is provided by Model L, says manufacturer. Adjustable elastic headband provides secure, comfortable fit. Wraparound shape allows protective, comfortable fit over prescription glasses. Clear or colored lenses available as original equipment for replacements. *Progress Industries Inc.*

Circle No. 5

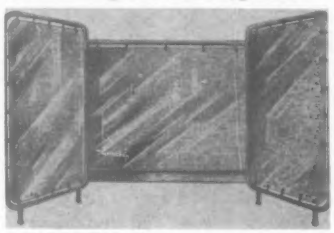
Dust mask

Entire mask is the filtering area in this new lightweight, urethane filter respirator called Resp-R-Aid. This mask is molded in one piece of plastic foam and has a functional filtering area more than double that of most other masks. Large filter area reduces inhalation resistance, making breathing considerably easier, with the urethane construction eliminating even minute particles. Unit consists of filter, plastic chasis with inhale valve and two exhale valves; and adjustable neckband which is fastened to plastic retaining band. Filter can be washed many times, and does not absorb odors and will not mildew or deteriorate. *Watchemoket Optical Co., Inc.*

Circle No. 6

Welding screen

Lightweight welding screen offers industry protection plus portability. Screen itself is made of 1-in. tubular steel with slip joint construction that eliminates threads and makes assembly easy. Curtain material is aluminum asbestos—pure aluminum foil permanently laminated to Underwriters Grade asbestos cloth. It protects against heat and flame by reflection and will withstand up to 1,400 F. Can be used as a three-sided enclosure or, by the addition of special legs, can be used as a straight-line wall curtain. *Singer Glove Mfg. Co.*



Circle No. 7

Face shield

Kool-Vent is a safety face shield that combines vision with ventilation. Designed for use by industrial workers who require both visibility and face protection while working in heated areas, the Kool-Vent shield incorporates an optically correct acetate window in a fine metal 24 mesh screen, 8 by 11½ in. Shield is held securely before the face by means of an adjustable fibre headband. It can be worn with glasses. *American Optical Co.*

Circle No. 8

Cover lens

Sta-Kleer is a new all-plastic weldor's cover lens claimed to give 40% more life with no increase in cost. *Thermacote Co.*

Circle No. 9

Eye shield

The elimination of overhead glare, combined with style and comfort, makes the Eyeshade Spec ideal for eye protection where overhead lighting creates a problem. Eyeshade Spec shades the eyes from above while the one-piece optical plastic lens gives full protection from impact. All models have one-piece lens which can be replaced without tools. Models come with sideshield lenses in either clear or medium green. *United States Safety Service Co.*

Circle No. 10

Lift front retainer

A lift front plate retainer molded of rugged nylon plastic has been developed for premier line of welding helmets. Manufacturer says that in addition to stronger construction the new Model S retainer has good infra-red resistance and can hold many safety, welding, etc. plates without sacrificing its compact design. Retainer has firm plate retention, and changing is simple, the spring readily accessible and easy to snap out. *Sellstrom Mfg. Co.*

Circle No. 11

Gloves

Because of their flexibility, Permatex Gloves can replace thin leather gloves in inspection, handling small parts and other jobs where careful hand manipulation is required, says manufacturer. Available in canary-yellow in attractive slip-on style, they are uniformly coated with vinyl. Gloves are washable, odorless and liquid repellent. *Advance Glove Mfg. Co.*

Circle No. 12

Safety hats

SuperGlas safety hats and caps have a single-injection-molded polyethylene suspension unit with both a fixed safety factor with a 1¼-in. clearance from the crown of the hat, and an additional adjustable clearance laced to fit the individual user. Entire suspension, including headband, is soft, pliable and easy to clean. It is interchangeable in all styles of company hats and caps, both old and new. Added coating of fine-spun glass fibres placed near outer surface of shell increases life and makes color more lasting and the surface more resistant to weathering and abrasion. *Fibre-Metal Products Co.*

Circle No. 13

Shown on these pages are new products which will help you to work safely. If you want more information on any equipment listed, use card on Page 89 to circle numbers of such items.

Four-sided screen

This is a four-sided screen for use in welding and other applications requiring complete enclosure. Four-some is constructed of 1-in. tubular steel with a durable rustproof black oxide finish. Slip-joint construction makes assembly a quick job. There are no time-consuming threads. Extremely light—the 6-ft screen weighs only 85 lb. Folds for storage or removal to new location. *Singer Glove Mfg. Co.*

Circle No. 14

Head protectors

Completely new line of hats and caps is available in fibre-glass, aluminum or plastic-electrical shells. New line features a plastic-zippered polyethylene suspension which is easily removed for cleaning and sterilization. Also, the suspension system tightens to the hat shell on impact, rather than loosening. *Flood Safety Products Co.*

Circle No. 15

First-aid kit

New C-Thru window in cover of Davis First Aid Kit makes possible effective and rapid inventory of supplies. Kit has red cellophane zipoff tab, absence of which signals an open carton. Cartons have C-Thru windows, too, so contents are visible. Units can be hung on wall and quickly removed when needed. *Davis Emergency Equipment Co., Inc.*

Circle No. 16

NATIONAL SAFETY CONGRESS: 1959

Safety in '60's draws 12,500 persons

APPROXIMATELY 12,500 persons jammed eight Chicago hotels for the 47th National Safety Congress, recently presented by the National Safety Council.

During the Congress 834 speakers were introduced at more than 200 separate sessions. Also, approximately 190 exhibitors were on hand to show their safety and related equipment.

At one session, John W. Leask, industrial sales manager of Picker X-Ray Corp., White Plains, N. Y., discussed industrial radiation safety. He compared radiation to a firearm, saying neither is dangerous if properly handled.

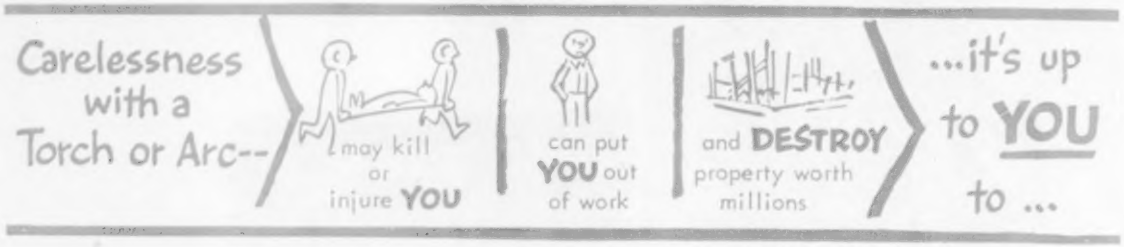
Leask says that radiation is being used throughout industry in hundreds of ways. "A certain quantity of radiation has been accepted by all physicists in the field and by experts in genetics as being completely safe. We are all receiving cosmic radiation all the time and some additional radiation in an industrial plant is not harmful if proper precautions are taken."

Precautionary equipment, such as film badges and pocket instruments to record the amount of radiation the wearer has been exposed to, were explained.

J. F. Chocole, of Chicago Bridge & Iron Co., Chicago, emphasized the importance of delegating safety responsibilities to persons who have time to handle this job thoroughly. A safety program conducted only half-way will make the men only half-safe.

Chocole also spoke on the difficulty of insuring the safety of field workers. The problem is aggravated because field personnel move from job to job. Thus, the problem of education and interest is more difficult than it is in a plant with steady workers.

The arc and flame are both handy tools—but dangerous ones if misused


Carelessness with a Torch or Arc--
may kill or injure YOU
can put YOU out of work
and DESTROY property worth millions
...it's up to YOU to ...

Protect lives, jobs, property when

welding or cutting

(Here are the main causes of fire, and ways to eliminate fire hazards)

1 FLYING SPARKS cause most fires —they can travel 35 ft RED HOT.

2 FALLING SLAG can drip as molten metal through cracks—out of sight of goggled operator.

3 HOT METAL being worked on (back side or cut off pieces) can set fire or cause explosion of nearby flammable liquid.

BEFORE STARTING A welding or cutting job, there are several check points you should make.

First, see to it that equipment is in safe operating condition.

Second, be sure you are familiar with the manufacturer's instructions for safe operations.

Third, be sure the work area is reasonably safe. Beware of fire spots, such as flammable gases, vapors, dusts, which may be lurking in tanks, pipelines, vents or bins, just waiting for a spark to ignite them.

Fire tempters, such as oil waste, drip pans, straw, paper and burlap, all flare up fast. Slower, but equally hot fire tempters are wood floors, coal, oil and tarpaulins.

Cracks or openings are dangerous passageways for sparks or molten metal to reach unseen combustibles. Or, delayed fires can occur when sparks or hot metal smolder unnoticed to flare up later when no one is around—during lunch break or after hours.

The final check point before lighting up is with the area supervisor to be sure your welding or cutting operation has been OK'd.

Copyright 1959 by National Fire Protection Association. Information has been reproduced by special permission from folder "Sparks Astray." It is available in quantity with samples obtained by writing NFPA, 60 Batterymarch St., Boston 10, Mass.

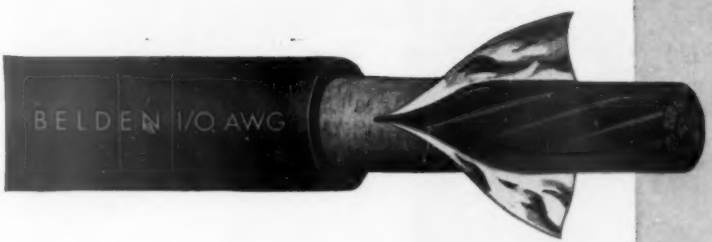
As you work partially blinded while wearing goggles or helmet, you may need a watcher for stray sparks or slag. You may also need another on the floor below.

If practicable, work in an area free of combustible material. Avoid paint spray rooms, dip tanks, storage areas, ventilators and other fire prone spots. Never cut or weld near explosive mixtures. Work on flammable containers requires special precautions to prevent explosive mixtures from building up.

Move combustibles at least 30 to 40 ft away. Sweep floor before you light torch. Wet down wood floors. Over 80% of cutting or welding fires are from portable equipment. Before you cut or weld in a new location, check with nearest supervisor.

Protect combustibles from stray sparks, slag and hot metal. Use metal shields or fire-resisting covers large and tight enough to keep sparks from going under or between. Use heat resisting asbestos shields to protect walls, ceilings, floors while you work.

Belden Welding Cable
the Complete Line



O.T.R. Rubber-Jacketed Cables
Oil-tempered rubber gives the best balance between easy handling, flexibility, and resistance to the effects of oil, heat, cold, and mechanical abuse.

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Resist oil, grease, heat, sunlight, mechanical abuse, and ozone set up by high frequency welding or atmospheric conditions.

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High voltage-frequency vinyl insulation affords perfect resistance to corona and ozone cracking . . makes this cable ideal for high frequency welding. High resistance to abrasion, oil, and impact.

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18-1-9

GLEAMING interior of finished rocket chamber forms a frame around Ryan welder as he spot welds another case.

Foil-gage steel rocket chambers spot welded

WHAT IS THE BEST method of containing the explosive force—measured in hundreds of thousands of pounds—developed by rocket motors?

Ryan Aeronautical Co., San Diego, has built light-weight rocket chambers strong enough to withstand 305,000 psi wall stress. The chambers are fabricated by "strip-winding" and spot welding multiple layers of foil-thin steel strips.

A variety of quarter-scale rocket motors have been built and tested by the firm and this research (in which strengths much higher than those obtained in solid wall cylinders have been realized) is being adapted to full-scale rocket motor requirements.

One major problem successfully overcome to obtain this high strength was reduction of stress concentration around the welds through improved spot welding techniques. (The firm's welding engineers spot welded as many as 20 layers of thin-gage material.)

The new techniques have also enabled company engineers to overcome another major hurdle in rocket chamber construction, attaching end closures. With the new method, end closures of 17-7 PH stainless steel were welded in place and successfully withstood the 305,000 psi stress.

(In addition to the utilization of stainless steels, Ryan will build at least one sub-scale model chamber of titanium alloy.)

Two methods were tried on chamber construction, and neither was suitable. Brazing the layers together introduced extra weight, and temperatures high enough for good brazing weakened the parent metal. Resin bonding of the layers, on the other hand, did not work well because the layers separated when confronted with the high temperatures of aerodynamic heating.

An extensive search was made for a material meeting all construction conditions of these chambers. Metals tested included 17-7 PH stainless steel, 301 extra full hard, AM355 sub-zero cooled, cold rolled and tempered stainless (in both 30% and 70% cold reduced types), HE-25, PH15-7 Mo, and AM355 cold rolled and tempered. (Presently being tested is AM355 cold rolled and tempered extra hard, which was not available when the other metals were being examined.)

Two-ply spot welded specimens, ranging from 0.300 to 0.750 in. in width, were made from each of these alloys, with the number of spot welds varying from one at the center of the strip to overlapping spots across the entire width.

Testing included determination of parent metal yield and ultimate strength, Young's modulus and per cent of elongation, ultimate strength reduction due to spot welding, and a strength-to-weight comparison, which was determined by dividing ultimate strength by material density.

These tensile tests, by themselves, were not enough to warrant elimination of any one metal, so tear tests of the various metals were made.

There is a correlation between the type of tear, the tearing force and the ability to predict ultimate load on a laminated structure. A straight line tear, rather than a jagged line, plus a high tearing force are desirable qualities. But this test also proved inconclusive, since all the alloys tested tore in a straight line, and all required approximately the same amount of tear force.

The next test was a drop-ball impact designed to measure the metals' relative brittleness, and to obtain an idea of their relative ductility. Each alloy was tested to fracture point, and it was found that AM355 sub-zero,

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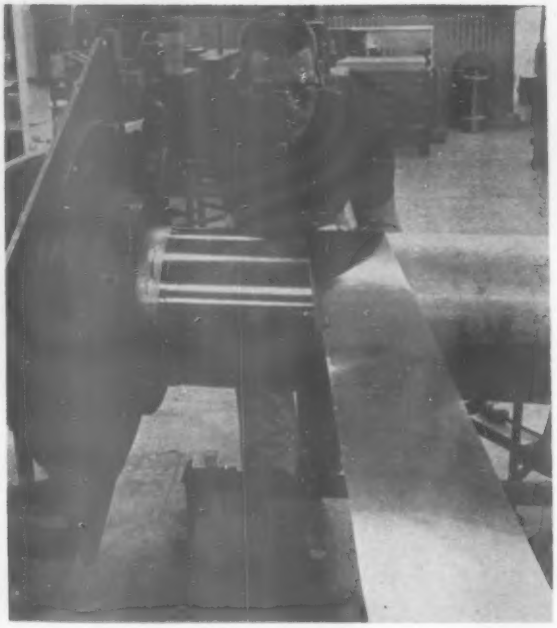


SUPER-strength steel, tissue-paper thin, spirals slowly onto mandrel, where it is tack-welded into position prior to spot welding.

cold rolled and tempered (30% cold reduced) alloy absorbed the greatest amount of energy prior to failure.

One further test involving all of the metals under consideration was made; determining the brittle fracture characteristics of each type with the help of the Mechanics Div. of the Navy Research Laboratory.

Results of the five tests showed four metals could be initially selected: HS-25; AM355 SCCRT (both 30% and 70% CR); and AM355 CRT. Because of its density, HS-25 was eliminated, and AM355 SCCRT, 30% CR was eliminated because of its relatively low tensile strength. Subsequent testing has been concentrated on AM355 CR 70% and AM-355 CRT.

Research is in progress to raise the 300,000 psi ultimate allowable tensile stresses of laminated structures made of the AM355 series of alloys. This research centers around the modification of resistance welding techniques, including electrode shape and material, current density and wave shape, and weld nugget size.

RYAN engineer inspects rocket chambers ready to take 305,000 psi test pressure while weldor "stitches" a new case together.

METALWORKING Briefs

Inert-Gas Welding Fixes Damaged Cooling Turbines; Saves Navy $2150 Apiece

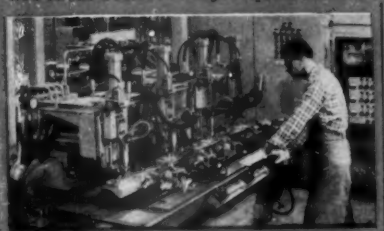
Basic economics: If a damaged cooling turbine costs $2300 to replace, you try to fix it first. When Norfolk Naval Station faced this problem, they found that only inert-gas tungsten-arc welding could make the delicate welds needed to secure the .004-in. special stainless alloy fins.

After damaged fins are cut from the hub, the section is machined to a U-shape and ground to a satin finish. New fins are welded in place with a HELIARC HW-10 torch. The HELIARC welds easily withstand the turbine vibration of 14,000 revolutions per minute and temperatures over 1750 deg. F. *Total cost of repair: $150.*

New Tape-Controlled HELIARC Machine Mass-Produces "Problem" Missile Parts

A tape-controlled, multi-torch machine, invented and developed by LINDE, makes more than 2500 HELIARC spot welds per hour on problem parts for "Terrier" surface-to-air missiles built by Convair. The machine covers a 20x80-in. area. Accuracy is better than .001 in. and welds meet shear-strength requirements of 2000 lbs. each.

Since many "Terrier" parts, such as control and dorsal fins, can be welded from only one side, resistance spot welding is impossible. HELIARC spot welds are ideal because they require access to only one side. The fins are made from 1020 carbon steel and 17-7 ph stainless, varying from .0016- to .0090-in. thick.



2500 spot welds an hour on "Terrier" problem parts.

A punched-tape controls the weld locations, torch combinations, time and current at each step. These LINDE machines are adaptable to semi- or fully-automatic production. They can be equipped with enough HELIARC torches to produce a theoretically unlimited number of spot welds simultaneously.

HELIARC spot welding utilizes a new LINDE-invented method of positive and instantaneous arc ignition—Pilot-Arc starting—which eliminates all high-frequency interference and avoids the contamination of retract starting.

Although particularly suited to the aircraft and automotive industries, HELIARC spot welding is a precision process, adaptable to any industry which demands complete mechanization, high speed, and top quality on a mass-production scale.

MECHANIZED WELDING QUADRUPLES ALUMINUM AIRCRAFT PARTS OUTPUT

A quick switch, from manual to mechanized welding, has more than quadrupled production of oil-temperature regulators and fuel-to-oil heat exhangers at Airesearch Manufacturing, Los Angeles.

SWM-2 SIGMA welding machines join the 6061 aluminum parts at speeds up to 85 inches per minute. Replacing manual covered-electrode welding, LINDE's inert-gas process reduced production time on the heat exchangers from one hour to 13 minutes, and on the regulators from 40 minutes to ten minutes. As a result, daily production of these two units has increased from 8 to 35 and 12 to 48, respectively.

Short Work With "Short-Arc"

To increase production of tank-ejector units while reducing costs, Fletcher Aviation, Rosemead, Calif., replaced covered-electrode welding with LINDE's new "Short-Arc" welding process. It uses a 16-oz. torch with a low-voltage, short-arc for easy control of steels .030 to ⅛-in. thick.

The high welding speed, semi-automatic operation, and slag elimination (photo) increased Fletcher's production from 50 to 300 units a day. Unit cost shrank from $1.14 with covered-electrode welding (labor and overhead, $1.12; consumables, 2¢) to only 29¢ (labor, 19¢; consumables, 10¢)—a saving of 75 per cent.

America's Missiles and Satellites Soar On HELIARC and SIGMA Welded Joints

Inert-gas shielded-arc welding plays an important role in fabricating American satellites and missiles. The Army's "Explorer," made from .025-in. stainless at Cal Tech's Jet Propulsion Lab, Pasadena, and the Navy's "Vanguard," made from .090-in. magnesium alloy at Brooks & Perkins, Detroit, are both welded with LINDE's HELIARC HW-9, HW-17 and HW-18 torches.

Rocketdyne Division of North American Aviation, Canoga Park, Calif., uses HELIARC welding on the Redstone engine's heat exhanger, thrust chamber, and peroxide tank. The process makes top-quality welds on all the parts, despite the varying thicknesses of aluminum and 17-7 ph stainless.

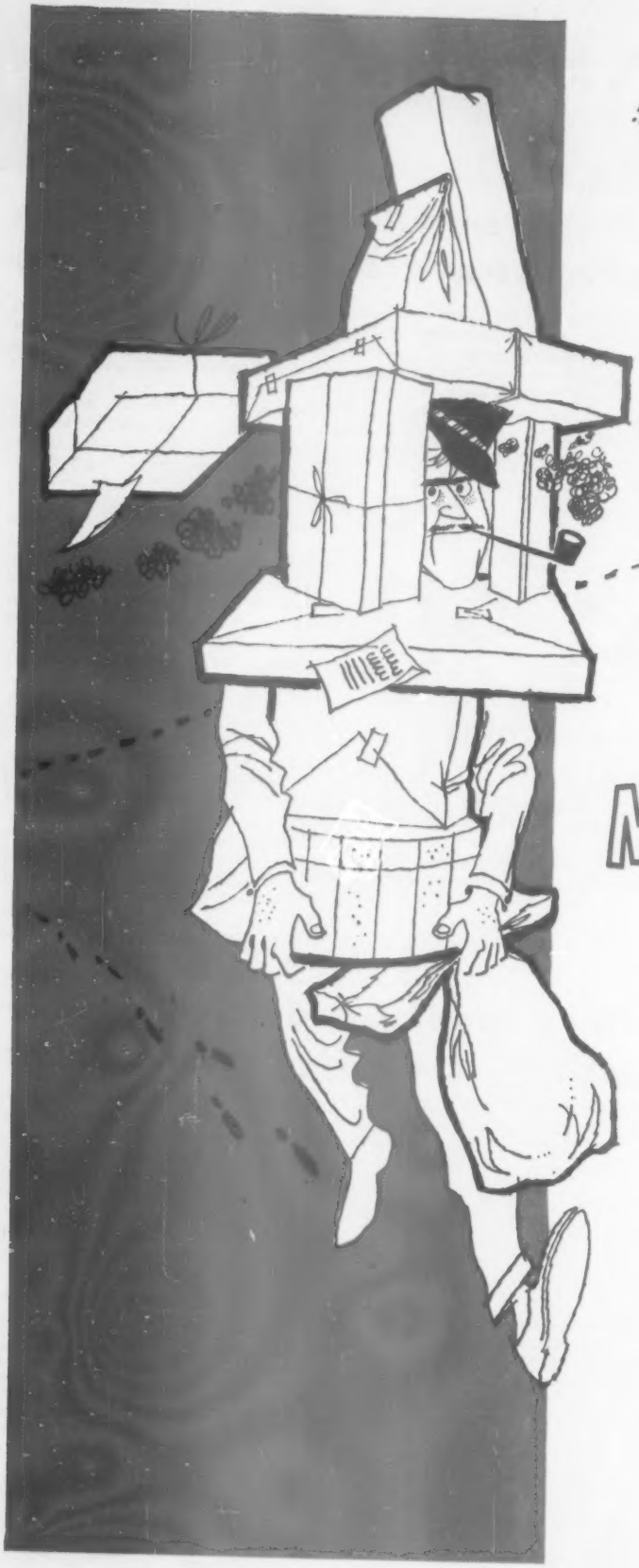
Reynolds Metals' missile plant in Sheffield, Ala., uses mechanized SWM-3 SIGMA welding to make more than 1000 ft. of welds on the 5086 aluminum outer jacket and center section of the "Redstone" and "Jupiter-C" missiles. The longitudinal and circumferential welds reach speeds up to 100 inches per minute.

During all fabrication, the HELIARC and SIGMA welds are protected from atmospheric contamination by 99.995% pure LINDE argon.

Precision welding pays off—neither the satellites nor the missiles have ever failed due to faulty welds.

FOR DETAILS . . . on any of LINDE's modern welding methods and for regular copies of LINDE's 24-page, bi-monthly METALWORKING BULLETIN, write Linde Company, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N.Y. In Canada: Linde Company, Division of Union Carbide Canada Limited. "Linde," "Heliarc," "Sigma," "Unionarc," "Unionmelt," and "Union Carbide" are registered trade marks of Union Carbide Corporation.

Linde UNION CARBIDE



ARE YOU A MULTI-BUNDLE BUYER?

Think of the poor fellow who buys a shirt from one store . . . a suit from another store . . . and a topcoat and a pair of shoes from still a third. His bundles grow; invoices, statements and receipts from so many sources multiply his paper work; and delivery dates are uncertain.

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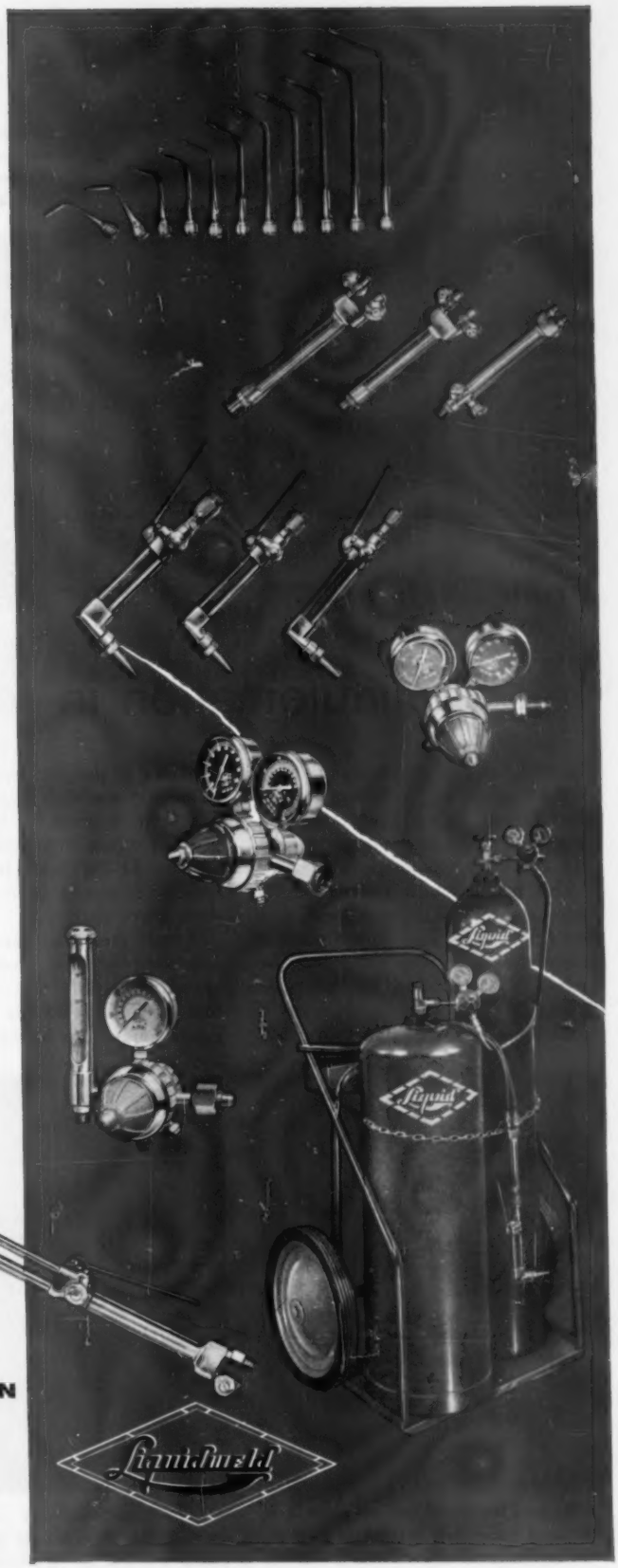

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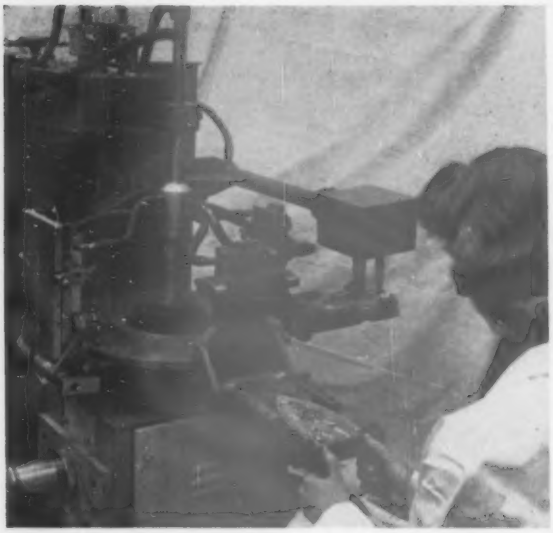


by **Douglas D. Williams**

OPERATOR loads the work-piece into the jig, which then locates itself under the electrodes and finally under the flash test probes. The final product (below) can be welded, tested and ready in minutes.

From England...

Semiautomation in resistance welders

VISITORS TO THE WELDING section of the Engineering, Welding and Nuclear Energy Exhibition at Olympia, London recently saw a large number and variety of automatic welders.

This trend toward automation reflects a desire for more speed and less cost in consumer goods production—especially those which can be conveniently assembled by resistance welding techniques.

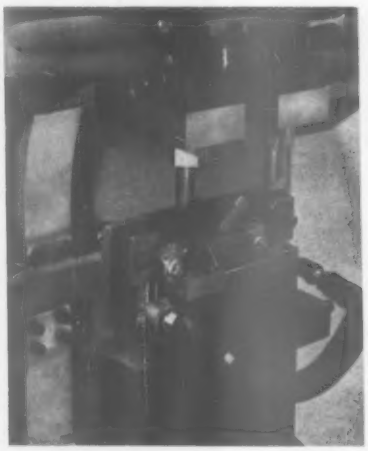
Resistance welding of certain goods provides a use for semi- and fully automatic machines; and since welding time is short, it is reasonably easy to attain improved production speeds. At the same time, product quality is more easily controlled; thus, fewer rejects.

When designing special-purpose resistance welders, close liaison is maintained with the customer so that every facet of his manufacturing technique can be studied. In this way, means are frequently found for automating additional operations.

These special machines may also provide automation of operations other than welding: *e.g.*, a new welder produced by Electro Mechan-Heat Ltd., Surrey, England.

Used for welding metal connections of a main plug-socket to the resistance element of an electric iron, the time cycle of the entire machine is governed by two timers—a 3-stage

WORK-handling jig shows sole-plate and two metal connections located in position prior to closing the jig.



WELDING electrodes are ready to join metal connections to the plate. Preset springs provide welding pressure.

JIG opens when the table descends, and when the work table makes another 90 deg turn, it is under the test probes.

timer to control welding, and a single-stage timer to control work table functions. Both are highly variable, and unit speed depends solely on the operator's loading.

In the welder, a further operation has been automated, with consequent savings in handling time. This is a 1,500-volt flash test which assures each component leaving the machine is serviceable. The test circuit is interlinked with a control device which stops the machine and gives an audible warning should a component be faulty.

The welder's operation cycle begins when the operator loads the jig. A push on the main starter button causes the table to rotate through 90 deg, at which point a cam closes a switch, causing an air-operated locating block to engage with the table and stop rotation.

The table then rises and remains so for a period determined by the single-stage timer. This gives the operator time to load the next jig.

At the end of the time cycle, the table descends; the station locating block disengages, and the table rotates again through 90 deg (when the first operation is repeated) bringing the first jig under the welding electrodes.

As the table rises again, it depresses pre-set springs on the electrode support, allowing the center spindle carrying the electrodes to close the switch automatically. This switch starts the weld cycle, and the springs give the weld pressure.

On completion of the weld cycle, the weld timer switches off the current, but the table cannot descend until the work-table timer has completed its cycle. As the table descends, it causes the welding jig to open, so that on the next 90 deg turn, the open jig is under the flash test position.

The final rising of the table brings the work in contact with the flash test probes, and the depression of the probes connects the 1,500-volt supply between the element and the sole-plate. Providing the leakage current is below a pre-set figure, the alarm system will not operate and the work is passed as good.

As can be seen, automation and simplicity should—and do—go hand in hand.

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the welding clinic

Here you may find the solution to your welding problems, whether they concern design, production, construction or maintenance welding. Submit your questions for answering on this page.

How to qualify aluminum weldors

Question:

Could you outline how tests should be given to weldors prior to working on aluminum? We are especially interested in tests for butt and fillet welds.

Answer:

"As much as possible the weldor should be tested on thicknesses and compositions of aluminum with which he will be chiefly concerned. Individual approval should be given for each process, and testing should be repeated at appropriate intervals with individual weldors," says the Aluminum Development Association, London, England.

Generally, weldors are tested on butt and fillet welds. First, prospects should be qualified in the downhand position, then in other positions dictated by the job to be done. A stop and restart, at known positions, should be included with test pieces.

Cleaning, joint configuration and weld conditions affect weld quality, and should be checked along with the weldor's skill.

To best simulate the heat conditions which arise in actual production work, ideal test plate dimensions should not be less than 10 times weld width.

For conducting tests on butt welds, plates should be at least 1-ft long. Other dimensions, related to plate thickness, are: up to and including ¼ in., 6-in. wide plates; ½ in., 9-in. wide plates; 1 in., 12-in. wide plates.

The actual work to be done will dictate type of edge preparation, if needed.

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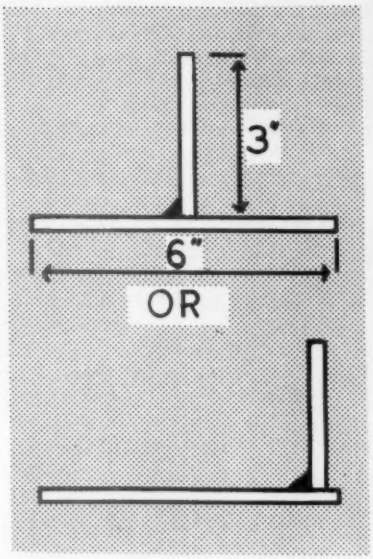

Fig. 1

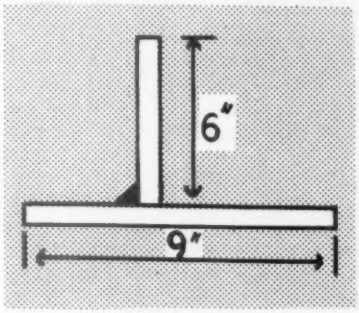

Fig. 2

Back-up bars should be used unless oxyacetylene welding is being tested. If weldors will have to perform unbacked welds, they must qualify under those conditions.

Fillet weld testing is diagrammed in Figures 1 and 2. In Fig. 1 are test welds for thicknesses up to ⅛ in. In the top example, plates are tack welded on reverse side of fillet weld. In alternate test, tack welds are made on same side as fillet. Fig. 2 is test sample for thicknesses above ⅛ in.

For pipe assembly weldors should be tested on rotated butt and/or fully positioned butt welds.

Weldors who must make backed and unbacked welds must qualify on both. For the test, pipe pieces should range in length from 6 to 12 in., depending on wall thickness. This is in accordance with butt weld test requirements stated above.

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*says Ben Ruff of Reed & Graham, Inc. "Before I had to change holders whenever the one I was using would get hot. Now, with DURO, I can weld a whole shift without the holder getting hot to my hand, even when using 5/16 in. hardfacing electrodes at high amperages."

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Proved by 27 years of weldor's preference

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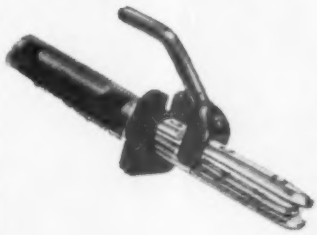

- All parts quickly replaced with a screwdriver
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The DURO "DUROGON" Tong-Type

- All parts quickly replaced with a screwdriver
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- DUROGON-N3—Aluminum body—extremely lightweight; less operator fatigue; mechanical cable connection
- DUROGON-N3HD—Bronze body—heavy duty operation; mechanical, soldered or brazed connection.
- "The BEST of this popular design"

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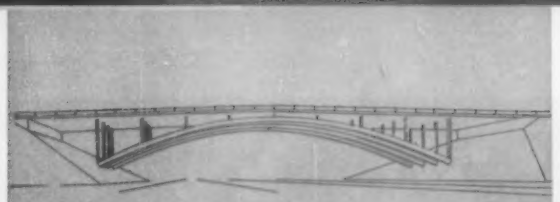


Welded structures dominate bridge competition awards

BRIDGES OF WELDED-STEEL DESIGN captured 11 of 15 awards offered in the $44,000 Steel Highway Bridge Design Competition sponsored by U. S. Steel's American Bridge Div.

The competition, under the auspices of the American Institute of Steel Construction, Inc., New York City, required entrants to design a steel bridge to carry a two-lane crossroad over a modern four-lane highway. It was open to professional design engineers and college students anywhere in the world.

Winning entries were selected on the basis of design originality, utilization of the properties of steel, economy and appearance.

An even 300 entries were received from 264 professional engineers and 36 college engineering students.

Top winner in the professional classification was Allan M. Beesing, structural design engineer with James J. MacDonald, Buffalo, N. Y., consulting engineer. His plans for a single-span arch of steel girders brought Beesing $15,000.

A combination of carbon and high strength steels are used to eliminate the need for a center pier. The bridge's main span is 160 ft long and requires 111 tons of steel. The composite-action, slab-type roadways supported by the steel requires 130 cu yds of concrete.

Other awards in the professional class were: second honorable mention, $5,000, awarded to the joint entry by D. M. Fraleigh, M. A. Shulman and W. J. Jurkovich, all of Sacramento, Calif.

Third honorable mention awards were made in the professional class to R. J. Prowse of Concord, N. H.; Klaus Wehrli-Bircher, Zurich, Switzerland; and to a joint entry by Michael and David Brunt of Aston Clinton, England.

Two Danish students, Niels J. Gimsing of Copenhagen and Hans Nyvold of Lyngby, won the $4,000 First Award in the student class for their welded two-span frame bridge. First honorable mention, $2,000, went to J. C. Costello, Dublin, Ireland, with second honorable mention and $1,000 going to a joint entry by J. A. Wood, J. A. Berridge and W. O. Evers, all of California Polytechnic College, San Luis Obispo.

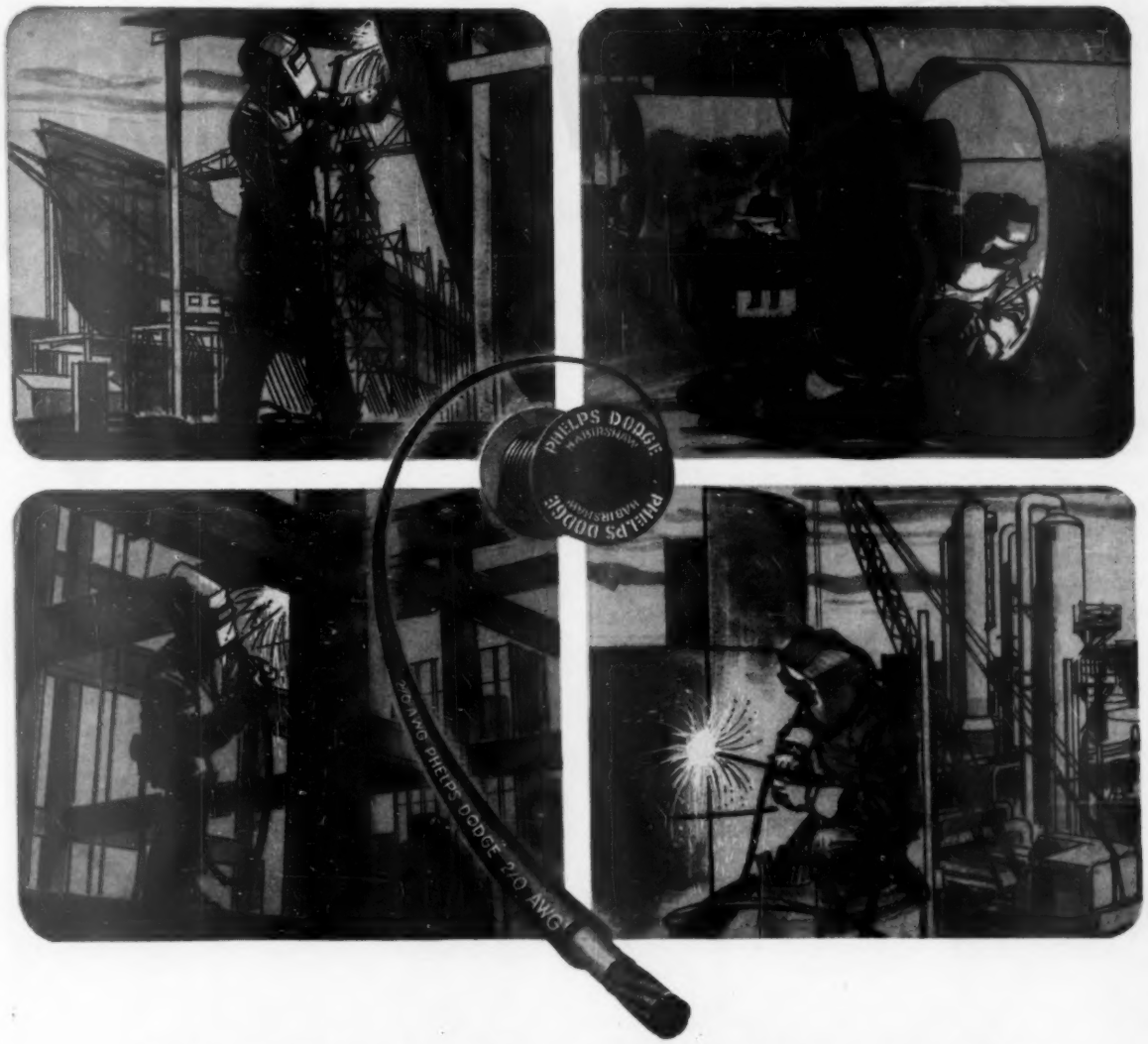
Third honorable mentions and $500 each went to the following students: H. C. Zenk, Truman, Minn.; T. R. Roberts, Neosho, Mo.; and J. A. Yura, Allentown, Pa.

J. C. COSTELLO of Dublin, Ireland, won $2,000 and first honorable mention for this design. Four arches of welded-deck structure cross a four-lane highway in a single span, eliminating center-support. Bridge is 196-ft long and has a 144-ft main span.

MODEL of First Award winning design submitted by Allan M. Beesing (right). With him is A. J. Paddock, president of American Bridge. Single-span of bridge eliminates center support in the median strip, thus removing a potential safety hazard, and giving a clear view of road ahead at all points.

D. M. FRALEIGH, W. J. Jurkovich and M. A. Shulman, members of Bridge Dept., California Dept. of Highways, shared $5,000 for this design. It is a two-span welded-girder bridge with single center support column placed in median strip of divided highway. Each span is 80 ft long. Structure requires 59 tons of steel and 113 cu yds of composite-action deck.

FIRST award in student class went to Niels Gimsing and Hans Nyvold of Denmark. Welded, two-span frame bridge is 162 ft long. Bridge was designed so sections can be mass produced with field erection requiring bolting of a few connections. Channel shaped cross sections in outer frames make stiffeners and connections invisible. No gusset plates and slice bars are used.



Phelps Dodge Habirprene* Arc Welding Cable

lasts longer under roughest working conditions!

The durable quality of Phelps Dodge Habirprene arc welding cable makes it ideal for use on jobs where welding cable undergoes severe physical wear and tear. Records show that Habirprene cable more readily absorbs heavy blows and weights, resists oxidation and damage caused by severe working conditions in shipyards, oil refineries, building construction and boiler-making plants. In some applications, Habirprene cable has lasted many times longer than rubber cable.

More than 10 years ago, Phelps Dodge pioneered Habirprene welding cable—the first real advance in this field. Today's Habirprene welding cable is the result of Phelps Dodge development and manufacturing experience devoted over the years to providing an arc welding cable of superior quality with a proven record for safety, dependability and long life. This cable meets all requirements of A.S.T.M. D752.

See your authorized Phelps Dodge distributor for hard-wearing, long-lasting Habirprene arc welding cable with indelible gold markings. Phelps Dodge also makes a full line of rubber arc welding cable and welding power supply cable. All these cables are available from stock.

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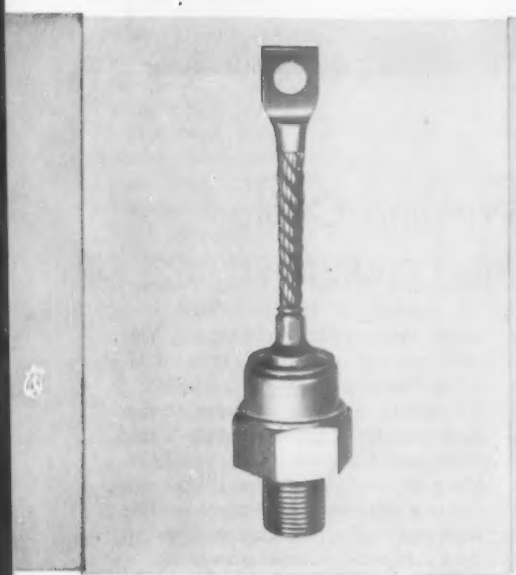
new . . . Silicon Type WS

200, 300, 400 and 500 Amperes
230/460 Volts
60% Duty Cycle



Silicon diodes in the three-phase, full-wave rectifier are the heart of the WS welder. These diodes have a capacity far in excess of the rating for the welder and are hermetically sealed against dust, oil, water and acid fumes by a new bonding process. Each diode is thoroughly tested before and after insertion in the bridge.

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Rectifier Welder

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- *Highest Degree of Electrical Efficiency*
- *Most Compact Welder in the Industry*
- *Extremely Low Maintenance*

The Type *WS* silicon rectifier welder reflects engineering skill of the highest order. This welder is designed for maximum performance and reliability. It is a product of experience—developed in the Westinghouse laboratories and tested in the field under a variety of conditions. The welder you purchase will be checked out in every detail before it leaves our factory. Every conceivable precaution has been taken to assure you of a faultless piece of equipment.

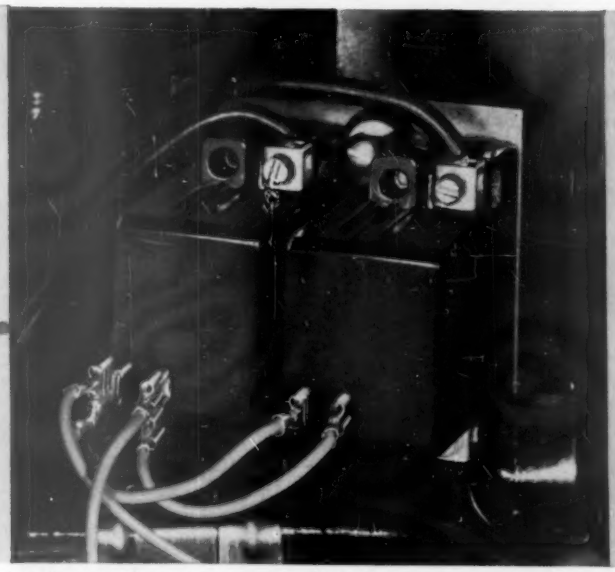
Westinghouse pioneered this completely new concept in industrial welding machines over 10 years ago. Since that time another refinement of the rectifier-type welder was achieved by Westinghouse through the use of silicon diodes. The ultimate in silicon rectifier machines is the Westinghouse Type *WS*.

No other welder on the market has the electrical circuitry to produce sound quality welds as consistently as the *WS*. It provides easier starting, arc stability and maximum drive. Silicon rectification means top welding performance.

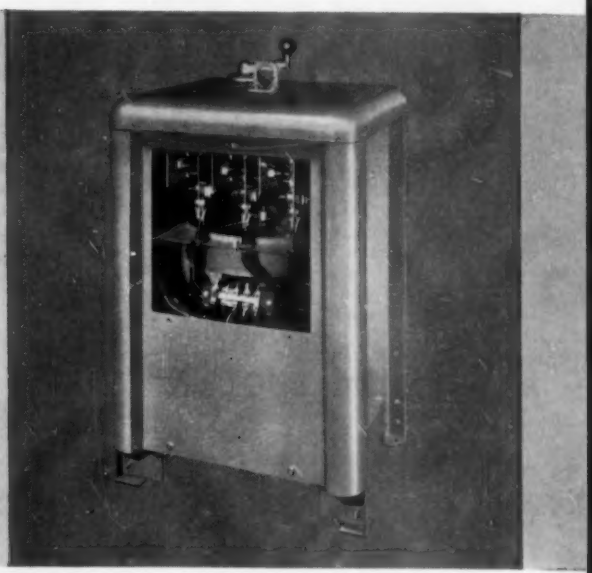
The *WS* is the lightest, smallest machine on the market. It is easy to handle and is a space saver. Its bonderized steel casing, protected by baked-on enamel, gives it a weatherproof construction. The high-quality materials in this welder will render long life and trouble-free service.

Learn more about this reliable source of power for welding!

Contact your nearest franchised Westinghouse welding distributor—or write: Welding Division, Westinghouse Electric Corporation, 4454 Genesee Street, Buffalo 5, New York. J-22150



The inverse time relay shown here allows adequate time delay for arc starting at high current setting and freedom from nuisance power interruptions—yet it protects against serious short circuit faults. Capacitors divert and store peak, high-value, short-time voltage spikes that occur when electrical current is broken.



The Type WS has virtually no moving parts to wear out; thus, replacement is at a minimum. The easy access panel shown here makes routine maintenance and air cleaning of the rectifier bridge a fast, simple operation. Be cost-wise, avail yourself of this extremely low maintenance!

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Here's a real opportunity for somebody yearning to get out of the shop and into the field as a technical service representative for a leading supplier of welding electrodes. Metal & Thermit seeks such a man with strong advancement potential to work out of its modern new offices at Rahway, New Jersey.

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The man we seek must have a solid welding background in manual and automatic welding with a minimum of five years diversified shop experience. Desirable, but not an absolute requirement, is a degree in metallurgy or welding engineering.

If you are interested in this challenging opportunity, write—outlining educational as well as welding experience and salary requirements to Director of Employee Relations & Administration, METAL & THERMIT Corporation, Rahway, N. J.

M&T welding products

METAL & THERMIT CORPORATION
General Offices: Rahway, New Jersey

At the 1959 Metal Show . . . . .

AN ESTIMATED 50,000 persons visited the 400 exhibits at the 41st Metal Show of the American Society for Metals held in Chicago's International Amphitheatre last month.

The exhibits, covering 300,000 sq ft and representing materials producers, fabricators and equipment manufacturers from 40 states and several foreign countries, included many from manufacturers of welding and allied equipment. A few of these ex-

SHOWN on these pages are the exhibits of the following firms: Picker X-ray Corp., Markal Corp., Lepel High Frequency Lab. Inc., Haynes Stellite Co., American Pullmax Co., Inc., A. O. Smith Corp., and Tempil Corp.

. . . . in Chicago

hibitors are shown on these pages.

Held simultaneously in various downtown hotels was the ASM Congress, during which some 275 technical papers were presented by the society and seven cooperating groups.

Warehouse stocks in all important cities and towns.

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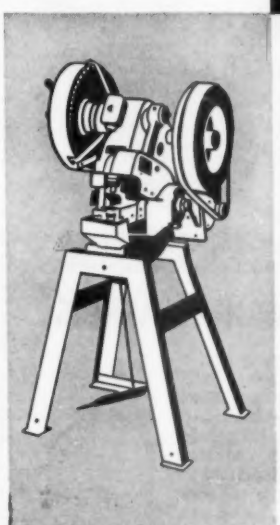

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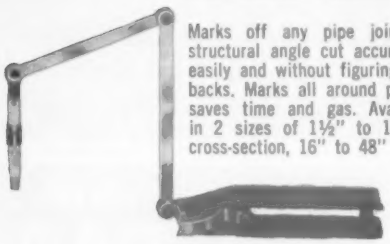

Marks off any pipe joint or structural angle cut accurately, easily and without figuring cut-backs. Marks all around pipe—saves time and gas. Available in 2 sizes of 1½" to 18" in cross-section, 16" to 48" diam.

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WELDOR completes pass on outside seam of large reinforcing piece.

Drill-rod production speeded by submerged-arc welding

BY SWITCHING to automatic submerged-arc welding in fabrication of connecting rods for giant draw-works equipment, a southwestern steel company is able to produce higher-quality welds in less than one-third the time needed with the covered-electrode process used previously.

These huge connecting rods, used in power plants of oil-well drilling equipment, are made from SAE 1020 steel. All parts are flame-cut and joined by submerged-arc welding using Linde Oxweld 3/16-in. wire.

Each connecting rod consists of a center, cut from 4-in. thick plate, and four reinforcing pieces, cut from 1¾-in. plate. The larger pieces have a 3-ft ID and 4-ft OD, while the small pieces have an 8-in. ID and 12-in. OD.

After the pieces are positioned with a 1½-in. jay groove, they are welded on the inside seams in 17 passes, then on the outside seams in 20 passes. High speeds of 18 ipm are reached with a current of 700 amp, 32 volt, d-c.

With fully-automatic welding, a connecting rod is completed in less than 11 hours. No between pass treatment is needed.

With the covered-electrode process, it took over 34 hours to complete one rod. This was due to low welding speeds, high spatter loss, extra chipping time, operator fatigue, and occasional weld defects.

"Baltospot is lightweight—the only completely portable 140-kv unit on the market. Ideal for inaccessible places."

E. E. Ellis says, "There's nothing to it. This unit will radiograph steel up to 1¾ inches thick."

"In less than a day I could teach anyone to make good inspection X-rays with BALTOSPOT,"

E. E. Ellis

J. B. Fisher

says E. E. Ellis, Welding Engineer and Radiographer, Fisher Tank Company, Chester, Pennsylvania. "One year of experience with Baltospot X-ray equipment proved to us that practically anyone can make good radiographs. There are just three simple steps:

1. measure thickness of part and refer to chart
2. make exposure
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X-ray inspection keeps us on our toes and is far ahead of other methods."

Does Baltospot Pay?

"It certainly does," says J. B. Fisher, President, Fisher Tank Company. "We exercise better control over all phases of work, and save approximately 77 percent in radiography costs. Helping our welders maintain uniform high quality and developing new welding techniques are prime functions of this, the most effective means of testing welds."

Your Westinghouse X-ray Specialist has information on the full line of industrial radiographic-fluoroscopic equipment, or write: Westinghouse X-ray Department, 2519 Wilkens Avenue, Baltimore 3, Maryland.

J-08369

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Here's a manganese electrode with improved ductility in weld deposits, freedom from cracks and excellent, overall weldability! Deposits possess full austenitic manganese work-hardening properties, matching manganese base metal, and provide physicals unexcelled in the industry! You'll find these new electrodes "tops" both for *joining* of parts and *buildup* of worn areas on all manganese steel equipment.

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EASY SLAG REMOVAL—Jobs clean up faster for multiple passes or in preparation for hard-facing overlays.

WHY WAIT? Check the unusual welding properties of this new, *better* manganese electrode today! Compare it with every other manganese electrode you've *ever* used... you'll agree it's the best in the field! Your Stoody dealer will be glad to have you test it on your own job!

PHYSICAL PROPERTIES:

(Based on tests by independent laboratory)

	DC Straight Polarity	DC Reverse Polarity
Tensile Strength	119,000 psi	111,000 psi
Yield Strength	67,000 psi	66,000 psi
Elongation in 2"	55%	37.5%

Hardness—Single pass on manganese steel; as deposited—15 Rc, as work-hardened—48 Rc.
Two passes on manganese steel; as deposited—18 Rc, as work-hardened—48 Rc.

STOODY COMPANY

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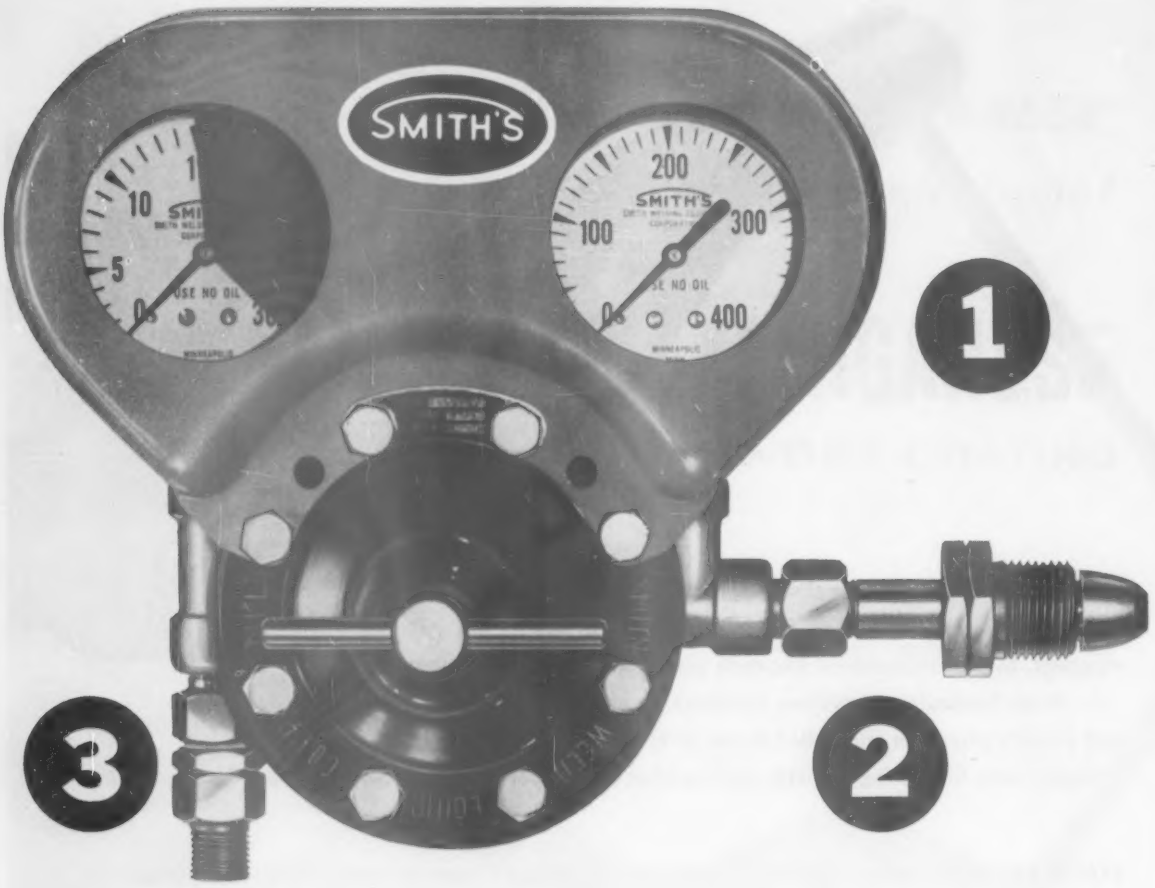

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2 *A Safety Inlet Connector* allows easy replacement of damaged connections without special tools . . . encourages quick repair, resulting in safer use.

3 *A Regulator Flo-Trol* on the down stream side of the regulator prevents reverse flow and mixture of gases, eliminating one of the explosive dangers in using a regulator.

These three exclusive features, together with 41 years of success of Smith's top quality design and construction, make the SAF-T-PAK Regulator your best equipment investment. Ask your Smith's distributor for the SAF-T-PAK Regulator, or write:

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(When cleaning tips, it is recommended that one size smaller drill be used)

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Airco	124, 144, 164 / 195, 198, 199													00						0						1		2		3			4
Canadian Liquid Air	All													00						0						1		2		3			4
Craftsman	B, BB, BL																				1						2		3				4
	K															1					2					3						
Dockson	All																	0			1						2						3
Gasweld	HC-31, HC-32												00		0											1				2			
	HC-39, WC-20[1], WC-35[1] / WC-10[1], WC[1]-55														0					1			2										
Harris	2890-F										00							0			0					1				2			
	6290													00			0			00			0			1					2		
	7490-A																									1			2				3
K-G	M4, M6													00						0						1		2		3			4
Liquidweld	20, 95[1]																				0		1				2				3		
Marquette	C, D[1], K																				OA6[1] / OA4[1]					1P / 1A6 / 1A4				2A6			
	M, M-1																			40	60					P1					P-2		
	E, L																	1R3			2B4					3B4	41	61	42		62		
Meco	All														0[2]								1				2						
National	All																	00			0		1				2				3		
Oxweld	CW[1]-29					2															4												
	CW[1]-23, CW[1]-45 / C-31, C-32					2								3							4								6				
Powr-Kraft (Montgomery Ward)	84-5884																									1				2			
Prest-O-Lite	420					2								3							4												
Prest-O-Weld	CW[1]-109																	0		1													
	CW[1]-110, CW[1]-111, C-111																			0, 1													
	CW[1]-120					2								3							4								2				
	CW[1]-122, C-112													3							4						5					7	
Purox	33[1]															0				1													
	34[1], 35[1]																				1												
	"E," CW[1]-202													3							4						5		2			3	
	CW[1]-200					2								3							4											7	
Rego	All													68						62						56			53		51		
Smith	Pipeliner MC[1,4]								000-6					00-6				61-1		0-6		2-4		3-4		1-6		1½-6		2-6			3-6
	Airline MC[4]																											4-4		5-4			
	Silver Star SC[5]								000					00						0				1				1½		2			3
Torchweld	150													68						62						56			53				
	257													68						62						56			53		51		
	250, 251, 253 / 643, 650, 651, 653																			62						56			53		51		
Victor	All								000			000½						00						0				1			2		3	
Weldit	S-25, S-37, S-45																									1			2				

Tradename	Series	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	1/8"	30	29	28	27	26	25	24	23	22	21	20	19	18	17
Airco	124, 144, 146 / 195, 198, 199				5				6						7						8				9							10[6]	
Canadian Liquid Air	All								6						7						8												
Craftsman	B, BB, BL				5					6					7																		
Dockson	All						4							5				6						7	8								
Gasweld	HC-31, HC-32 / HC-39, WC-20[1] / WC-35[1]				3									4		5																	
Harris	2890-F				3											4					5		6			7							
	6290				3										4			5			6												
	7490-A							4							5																		
K-G	M4				5																												
	M6				5				6						7						8					9					10		
Liquidweld	20, 95[1]			4				5					6					7			8												
Marquette	C, D, K						3A6			{3P 4A6 / 3A4										5A6 4P / 4A4				6A6										
	M, M-1	43		63				P-3		{64 / 44																							
Meco	All		3												4						5		6										
National	210, 300, 310			4				5																									
	400			4				5					6					7			8												
Oxweld	CW[1]-23, CW[1]-45			8							10																						
	C-31, C-32			8							10							12															
Powr-Kraft (Montgomery Ward)	84-5884				3										4																		
Prest-O-Weld	C-111		3											4																			
	CW[1]-110, CW[1]-111		3																														
	CW[1]-122						9								11																		
	C-112						9								11						13												
Purox	35[1]					4																											
	"E"						9								11						13												
	CW[1]-202						9								11																		
Rego	All			46				42							35						30					25							
Smith	Pipeliner MC[1,4]																				64-6												
	Silver Star SC[5]					3½		4													74-6												
Torchweld	250, 251, 253, 257																																
	643, 650, 651, 653			46				42							35						30					25							
Victor	All				4				5						6								7							8			
Weldit	S-25, S-37, S-45					3								4							5		6		7	8			9			

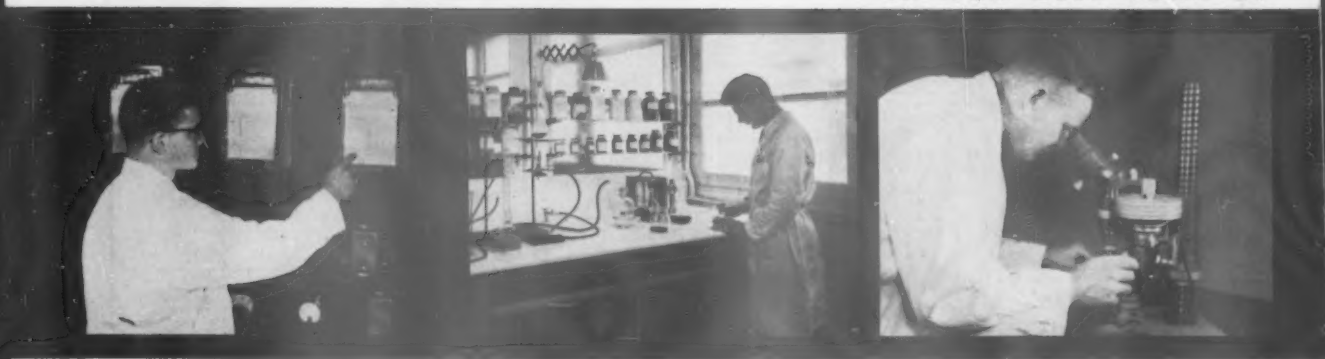
[1] *Cutting Attachment.* [2] *Also oo with 3 flame preheat.* [3] *Preheat: 4 flames.* [4] *Preheat: 6 flames.* [5] *Preheat: choice of 4 or 6 flames.* [6] *Tip size 11 drill size 10; tip 12 drill 2; tip 13 drill ¼-in. and tip 14 drill L.*

PROGRESS IS NEVER A

To the Welding Industry...

EUTECTIC RESEARCH MAKES THE BIG DIFFERENCE

IN OUR 20th YEAR OF



World Headquarters
Flushing, New York

MATTER OF CHANCE

Real progress doesn't "just happen". It must be carefully and deliberately *created!* It requires dedication and a relentless desire to make things better than they are.

Ceaseless research has been the key to EUTECTIC progress since its inception 20 years ago. It began with the discovery of the "Surface Alloying" principle and the development of the exclusive Low Heat Input Welding Process – and has continued through the development of the more than 160 EUTECTIC "Low Temperature Welding Alloys"®, Fluxes and Welding Aids. The purpose has always been the same: to develop better methods of providing faster, easier and stronger welds... *while minimizing stresses, embrittlement, distortion and warpage created by conventional high heat methods.*

Today, these efforts are still going on – more than ever before! Every year finds new plants... new laboratories... new equipment being added to our already extensive facilities throughout the world. Soon, a vast new Foundry and Metallurgical Center will be completed – heralding the start of the most ambitious research and development program ever undertaken by this or any other company in the field.

Progress, based on research, is the primary aim at EUTECTIC. And progress *to us* means better products, improved techniques, and greater service *for you.*

NEW FOUNDRY AND METALLURGICAL DIVISION being constructed will house complete facilities for metallurgical research and developments, as well as the actual production of core wires from virgin metal.

PROGRESS AND SERVICE

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Warehouses and Service Centers in ATLANTA; BOSTON; CHICAGO; COLUMBUS, OHIO; DALLAS; DETROIT; LOS ANGELES; ST. LOUIS; SEATTLE; BERKELEY, CALIF.; HURON, SO. DAKOTA; PHOENIX, ARIZONA.

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HIGHEST QUALITY

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National Carbide Company
A DIVISION OF AIR REDUCTION COMPANY, INCORPORATED
GENERAL OFFICES: 150 EAST 42ND STREET, NEW YORK 17, N. Y.
AT THE FRONTIERS OF PROGRESS YOU'LL FIND AN AIR REDUCTION PRODUCT

New TUFFALOY MUCH IMPROVED Tip Holders

For long life and ease of maintenance, TUFFALOY Series "E" straight ejector-type holders combine top performance with great simplicity of design.

The entire sturdy brass head, with its attached ejector tube, is forced into the barrel to eject the welding tip. Two rubber water seals prevent leakage. They are placed inside the barrel, hidden from dirt and damage. This design eliminates the small, easily distorted ejector plunger extending through the stationary head of most holders now on the market.

A threaded coupling holds head and barrel together, and permits the head to swivel freely. Loosen the coupling, even without removal from the machine, for inspection and maintenance.

Made in twelve models: barrels are 8" and 12" long, 1", 1¼" and 1½" diameter, and hold No. 1 and No. 2 Morse taper tips in threaded adapters, furnished as part of each holder. Adapters are RWMA class 2 alloy to reduce wear of the tip socket.

TUFFALOY Resistance Welding Alloys are widely available through AIRCO and TUFFALOY representatives. Call on them for Spotwelding Tips (Standard, TUFFCAP, Cold-Bent, and Special), Holders and Adapters, Bar Stock, Forgings, Seam Welding Wheels, and all other welding alloy needs. Ask for Catalog and Price List.

AIRCO

AIR REDUCTION SALES COMPANY
A Division of Air Reduction Co., Inc.
150 East 42nd Street, New York 17, N.Y.

30 YEARS AGO

(Taken from the WELDING ENGINEER of December, 1929)

—30 YEARS AGO—

The new Dodge Six bodies, known as the Dodge Mono-Piece type, are of one-piece welded construction and are said to have almost unbelievable strength and rigidity.

—30 YEARS AGO—

The rapid momentum gained in the construction of steel framework for buildings by the welding process was given added impetus recently with the completion of a new building for the Lincoln Electric Co., Cleveland.

—30 YEARS AGO—

L. H. Christensen has been appointed welding engineer for the Reid-Avery Co., Philadelphia.

—30 YEARS AGO—

Hill Equipment Engineering Co., St. Louis, recently organized by Lockwood Hill, has been named an exclusive distributor in its area by The Lincoln Electric Co. and the Baker Industrial Truck Co.

—30 YEARS AGO—

R. D. Thomas & Co. of Philadelphia and New York has announced that it has become a distributor for the new Arcos electrodes, which were developed in Belgium and only recently introduced in this country.

—30 YEARS AGO—

S. H. Taylor has been promoted to district representative in Los Angeles by The Lincoln Electric Co.

—30 YEARS AGO—

An editorial in this issue, in commenting on the "sudden decline in stock-market prices," states that "The rainbows in Wall Street and La Salle Street have faded away . . . the penitent prodigal son has his feet under a desk and his sleeves rolled up."

—30 YEARS AGO—

George R. Roberts is supervisor of the new Los Angeles office of The Alexander Milburn Co., Baltimore.

—30 YEARS AGO—

Compressed Industrial Gases, Inc., through its subsidiary, the Burdett Oxygen & Hydrogen Co. of Chicago, has completed erection and installation of an acetylene plant at Summit, Ill., an industrial suburb of Chicago.

World's champion corn picker welded with M&T Murex ELECTRODES

In the past eight years, five championships have been won by farmers using the New Idea corn picker. It is also the world's biggest selling brand. For the kind of welds that contribute to championship performance year after year, the New Idea Division of Avco Distributing Corporation depends on M&T Murex electrodes—products of METAL & THERMIT CORPORATION, General Offices: Rahway, New Jersey.

MUREX
PRODUCTS FOR BETTER WELDING

News shorts . . .

A division of Chemetron Corp., Girdler Construction in Louisville, and **Chemical & Industrial Corp.,** Cincinnati, have combined their activities and facilities. Both design and construct chemical and other industrial plants. Chemical is parent company with **H. H. Hamilton** as chief executive officer, while **W. R. Wood** is head of Girdler, the subsidiary firm. Also, a new plant producing oxygen, nitrogen and acetylene has been placed on stream at Edmonton, Canada, by the **Alberta Oxygen & Acetylene Co., Ltd.,** subsidiary of Chemetron.

"Increasing Alan Wood Sales in the Sixties," was theme of recent three-day marketing force meeting held by **Alan Wood Steel Co.,** Conshohocken, Pa. . . . **Air Reduction Sales Co.,** New York City, has started construction of a new $100,000 sales office and warehouse at 2300 South Boulevard, Charlotte, N. C. It will replace present facilities at 124 W. Third St. . . . **Metal & Thermit Corp.,** New York City, has established an **International Division** headed by **C. H. Carpenter, Jr.** The company has also started construction of a plant in Monterrey, Mexico.

Gulf Welding Equipment Co., New Orleans, has changed its name to **Gweco, Inc.** . . . The **Society for Nondestructive Testing, Inc.,** has presented its annual Deforest Award for "outstanding contribution" in this field to **Prof. R. C. McMaster,** professor of welding engineering at **Ohio State University** . . . Two plate fabricating divisions of **Union Tank Car Co.,** Chicago, **Graver Tank & Mfg. Co.,** East Chicago, Ind., and **Lang Co.,** Salt Lake City—have consolidated.

Welding training is now being offered in 21 New Jersey high school industrial arts classes. Instructors were trained during summer at **Trenton State Teachers College** under direction of **Robert Bercaw** of **Hobart Bros.**

on "tough" snagging and grinding operations . . .
. . . if PRODUCTIVITY is what you want!
PRODUCTIVITY is what you get!
with the
VEE-ARC
2 HP PORTABLE GRINDER

This **NEW** powerful but light-weight grinder does **MORE WORK** with less operator fatigue . . . **DESIGN-ENGINEERED** for use with 9" disc wheels . . . can be plugged into nearest 120-v. AC power outlet . . . **LIFE-TIME LUBRICATED** . . . **TAMPER-PROOF SEALED** . . . **SIX MONTHS WARRANTY.** All this . . . and more for only **$168.00** f.o.b. nearest distributor.

Clip Coupon and Mail Today!

VEE-ARC CORPORATION
Dept. WE WESTBORO, MASSACHUSETTS U.S.A.

Tell me more about this Vee-Arc Portable Grinder:

Name_____
Firm_____
Address:_____
City_____ State_____

POWER . . . PRECISION . . . PERFORMANCE . . . **PRODUCTIVITY**

World's thirstiest flood pumps welded with M&T Murex ELECTRODES

Some of the biggest pumps in the world are controlling flood damage in Florida's Lake Okeechobee area. With intake pipes 12 feet in diameter, they suck up swimming pool sized gulps of flood waters every second, spew it out into a series of reservoirs. Though not yet complete, the system has already prevented an estimated $44-million damage. The thirteen Fairbanks-Morse pumps in use were welded with M&T Murex electrodes—products of METAL & THERMIT CORPORATION, General Offices: Rahway, New Jersey.

MUREX
PRODUCTS FOR BETTER WELDING

News shorts . . . continued

Co., Troy, Ohio, **Robert Gihand** of **Linde Co.,** New York City, and **Kevin Sheppard** of **R. S. McCracken and Sons,** Hobart distributor, Trenton.

National Electric Welding Machines Co., Bay City, Mich., expects to reveal shortly, a new automated strip welder capable of operating with a fast-moving, strip-mill tin-plate coil-inspection or annealing line . . . A new edition of its study on equipment leasing for smaller manufacturers has been issued by the **Foundation for Management Research,** Chicago.

KSM Products Inc., Merchantville, N. J., has published a new book on stud welding fasteners. It describes standard designs and specifications, and is available on letterhead request only from manufacturer . . .

Hamler-Lewis, Ltd., Chicago, and **North American Philips Co., Inc., Cryogenics Div.,** Mount Vernon, N. Y., will cooperate in marketing Philips' new Norelco Ammonia-Gas Separator . . . **Nelson Stud Welding's** FD generator (photo), said to be the largest single engine diesel welding power source ever built, is one of two being used to install 265,000 shear connector studs on the Bruckner Expressway in the Bronx, New York. Three stud welding guns can be operated simultaneously in the field from the new unit. It furnishes 2,000 amp. at 80 volts.

Tatnall Measuring Systems Co., Phoenixville, Pa., subsidiary of **Budd Co.,** Philadelphia, has been made a division of the firm . . . A **Linde Co.** distributor of welding equipment and commercial gases, **Welder's Supply Co.,** Seattle, has dedicated a new welding service center. Linde has released "Clear board for ribbonrail," a motion picture telling story of installation of continuous welded rail.

HI-AMP

ELECTRODE HOLDERS

CABLE ATTACHMENTS

GROUND CLAMPS

Offers

T.P.C.*

* THREADED POWER CONNECTION

Excessive heat in a welding circuit is oftentimes caused by a resistance build-up at some point in the welding circuit due to connections being loose or oxidization setting up in a mechanical type of terminal connection.

Shown in the above "cut-a-way" picture of an Electrode Holder is the new HI-AMP, T.P.C. type of connection that can be adapted to ground clamps and quick disconnect plugs as well as to electrode holders.

T.P.C. means a Threaded Power connection using the pressure of threads on a sleeve to drive the ends of any welding cable down into the depth of a cable socket, then locked into place with threaded plugs. An excellent electrical connection as well as providing direct contact with the welding cable to the accessory so that maximum heat is conducted into the heat-absorbing cable.

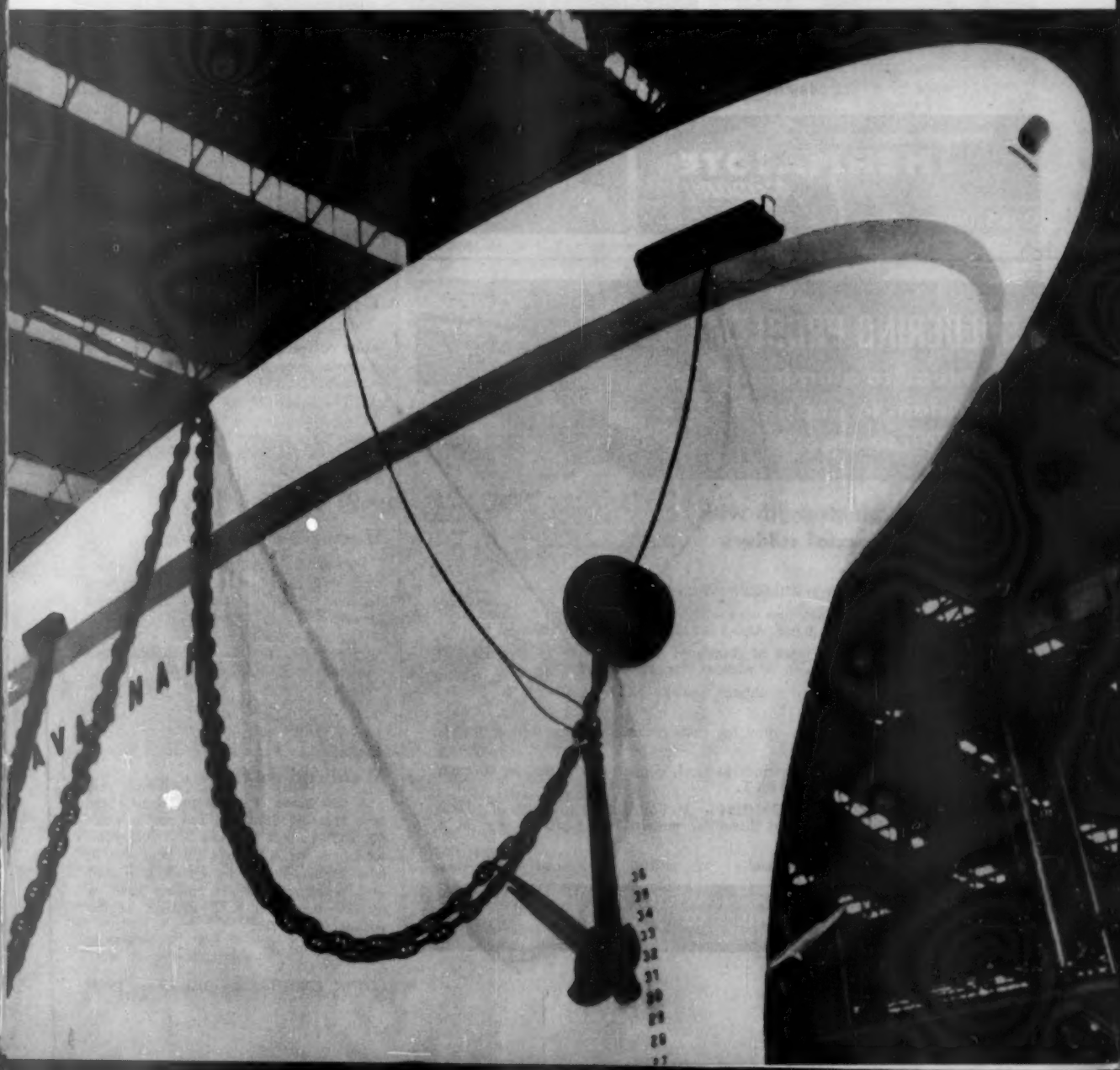
ASK YOUR WELDING SUPPLY HOUSE FOR FURTHER INFORMATION

354 W. ADAMS ST. LENCO, INC. JACKSON, MO.

World's first atomic cargo ship relies on M&T Murex ELECTRODES

The N.S. Savannah, world's first nuclear-powered merchant vessel, is designed to prove the feasibility of "Atoms for Peace." Scheduled for initial service in the summer of 1960, she will cruise at 21 knots with a cargo of 10,000 tons, a 110-man crew and 60 passengers. In constructing the safety container for the atomic reactor, heart of the vessel's power system, the New York Shipbuilding Corp. relied upon Murex electrodes—products of METAL & THERMIT CORPORATION, General Offices: Rahway, New Jersey.

MUREX
PRODUCTS FOR BETTER WELDING



THERMO is FIRST Again with a Revolutionary Sta-Kleer All-Plastic Cover Lens

Never Before Available for Use in Welder's Helmets

40% MORE LIFE

LABORATORY TESTS PROVE WHY . . . .

✓ TWICE as Scratch Resistant as any other All-Plastic Lens on the market.

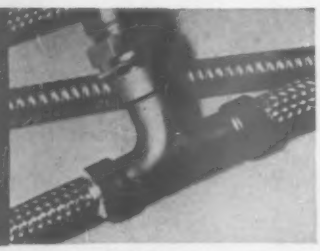
✓ 40% MORE Resistance to Molten Slag

Make your own test and PROVE to yourself that THERMO Sta-Kleer All-Plastic are the cheapest and safest Cover Lens you can wear.

See Your Welding Supply Dealer
or
write for a FREE Sample TODAY

THERMACOTE Company
108 S. DeLacey Ave., Pasadena, Calif.

SOLDERING PROBLEM?
stainless to aluminum?
aluminum to copper?
cast iron to steel?



BOEING 707 Landing Gear Harness
Braided stainless steel wire and flexible conduit had to be joined to cast fittings. Brazing burned the fine wire. ALL-STATE had a special solder which solved the problem. [See #430, below.]

You get high strength with ALL-STATE special solders

#7 Special solder for cast iron 450-600°F. Withstands 1000 psi P.

#37 Developed for joining aluminum with soldering iron at low 450°F. Good color match and corrosion resistance. Also joins dissimilar metals. 1000 psi P.

#39 Special solder to join all types of aluminum for both build-up (450°F) and capillary flow (650°F) – with or without flux. 8000 psi T.

#55 Newly developed aluminum "rubbon"® solder – NO FLUX – 705°F – 20,000 psi T. All aluminums.

#105 Special medium temperature alloy for both ferrous and non-ferrous metals (640-740°F) – to 25,000 psi T.

#107 The finest made to join aluminum to steel, copper and brass – or to each other (480-600°F) – to 25,000 psi T.

#430 NO LEAD, NO ZINC or CADMIUM – develops tensile strengths of 10,000 to 28,000 psi on stainless and dissimilar metals. For soldering iron at a low 430°F.

Send for ALL-STATE Instruction Manual. ®RUBBON is a registered trade name.

Distributor Stocked, convenient to buy. Economical to use.
ALL-STATE WELDING ALLOYS CO., INC., White Plains, N. Y.
Call WHite Plains 8-4646 or write for nearest distributor

new products . . .

Coiled tube electrodes

Copper-coated tube rods are now available for semiautomatic open-arc hardfacing. Haynes 90, 94 and 4560; Haynes nickel-manganese, Hascrome and Haystellite tube rods are all supplied in the 7/64-in. diameter drawn size, in convenient coils. The tube rod contains an internal flux to make open-arc deposition possible and insure a sound, slag-free deposit. The copper coating helps prevent rusting, makes feeding easier, and provides a good electrical contact through the welding head. The coiled rod is fed continuously, eliminating breaks in the operation to change electrodes. As much as 15 lb of 7/64-in. alloy rod can be deposited in an hour. *Haynes Stellite Co.*

Circle No. 17

Grinding discs

A new line of resin-bonded aluminum oxide coated abrasives, Metalite Type 101, is available on fiber discs and cloth belts. A modification, labeled 101T, has proved particularly effective on stainless steel, brass, bronze and other alloys. Fiber discs are made in a grit range from 150 through 24, belts from 180 through 25. *Behr-Manning Co.*

Circle No. 18

High-speed soldering

Flowsolder is high-speed soldering equipment now being used on printed circuits. To join small components to the printed copper wires, an automatic device pumps molten solder to form a standing wave or hill through which the unsoldered assemblies are passed. Machine has been operated with high melting solders to temperatures of 750 F. *Electrovert Inc.*

Circle No. 19

Weld rod coating

A new grade of potassium alginate has been specially developed for use in welding rod coatings. Protanal EV 200 is intended as an alternative for bentonite in basic or high-yield welding rods. It is used as a plasticizer and wet binding agent to increase the green bond strength of the coating. *Croda Inc.*

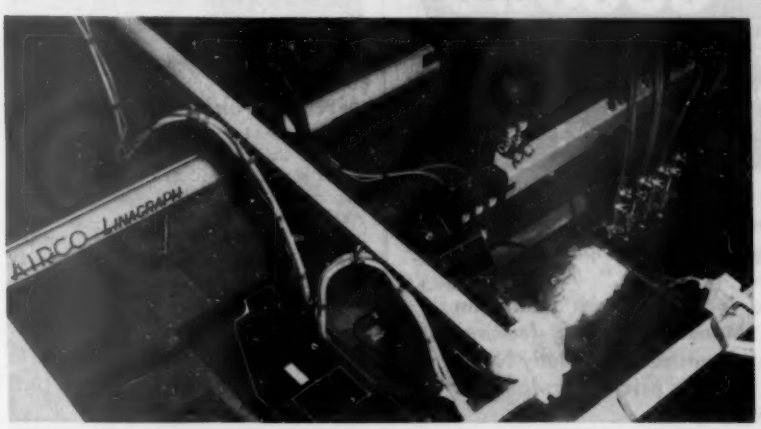
Circle No. 20

. . . . . use card on page 89

Weld timer

Porta-Count counts a-c cycles of weld time to an accuracy of ± ½ cycle and will count up to 127 cycles. This permits rapid checking of settings on welder controls. The light unit can be carried by foreman right on job so routine checks can be made to assure getting the correct timing. The binary counter provides the reading by means of lights. Accuracy is 100% and counting can be done up to speeds of 15,000 counts per second. No power connection or battery pack is needed. Circuit is completely transistorized. *Instrument Control Co.*

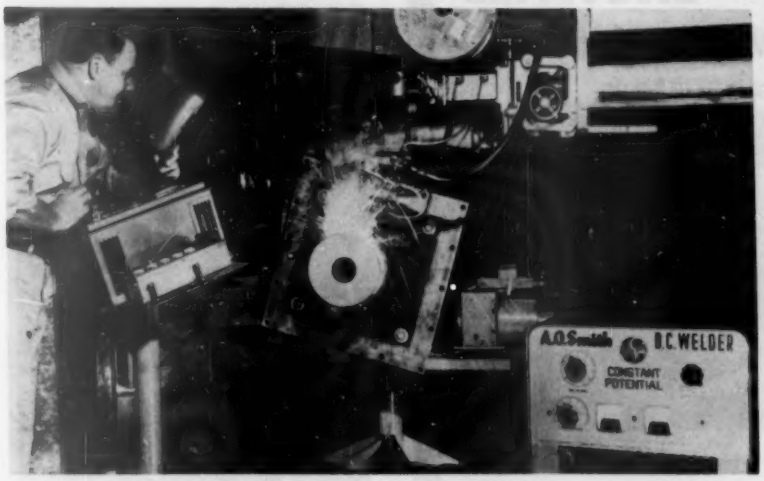
Circle No. 21



Gas-cutting machine

Linagraph is an automatic gas cutting machine which permits a fabricator to make up to four identical precision parts simultaneously using a single templet. Tracing is done on special table at one side, while the cutting tip traverses an identical pattern over the cutting table on the opposite side. The machine and the tracing table are mounted on the same rails, which conserves space and provides for maximum rigidity. The table is movable, allowing operator to nest parts, but is also easily locked in place. All controls for machine are located near operator. The machine is powered by 110 volts, a-c, and can be used with acetylene, propane or natural gas. Standard track length is 20 ft, with 10-ft lengths that can be added. *Air Reduction Sales Co.*

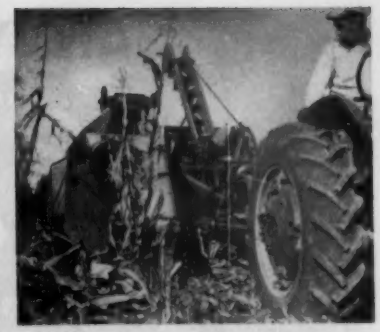
Circle No. 22



CO_2 production welder

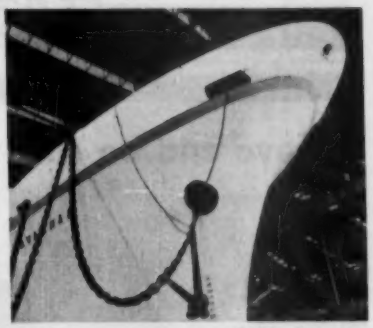
Weld wire is fed continuously without lag or slowdown at high-speed rates in a new fully automatic CO_2 welding equipment package including a welding head coupled with a 100% duty cycle, 600-amp constant-potential power source. The equipment uses small diameter wires designed for welding mild and medium carbon steels. It can be used for single and multiple-pass butt welds, flat and horizontal lap welds, positioned and horizontal fillet welds, and circumferential butt and fillet welds. Powered by a 1/6-hp variable speed motor, the welding head features a two-speed mechanical gear shift. Wire speeds from 55 to 1,200 ipm are possible. Welding power is provided by the 600-amp, constant-potential source with voltage control from 0 to 45. *A. O. Smith Corp.*

Circle No. 23



Corn Picker

Flood Pumps



Nuclear Ship

...where you find companies that take great pride in the superiorities of their product, you'll generally also find great reliance on Murex welding electrodes.

Murex electrodes comprise one of the broadest lines of quality rods and wire. Choose from over 1000 types and sizes —mild steel and low alloy, stainless, hard surfacing, etc. Ask the M&T man or send for free literature. Also for information on M&T's complete line of welding machines.

M&T welding products

METAL & THERMIT CORPORATION
General Offices • Rahway, New Jersey

SAFETY SAM says:

"I always use Dockson GOGGLES they give me more protection and comfort!"

MODEL 96 GOGGLES

MODEL 40 SPECTACLES

MODEL 492 GOGGLES

There is a Dockson goggle or spectacle to meet any requirement. Low cost, high quality equipment, "Built for better protection." Scientifically designed for safety with maximum comfort. Many outstanding features and careful construction usually found only in higher priced equipment. You'll like 'em!

Write for our Head & Eye Protection Catalog and name of your distributor.

3839 Wabash Dockson CORPORATION Detroit 8, Mich.

Save and be sure with ENGWALD Welding fume exhausters

- Systems have been approved for Government Health Depts. in U. S. & Canada.
- Guaranteed for highest efficiency.
- Portable & Stationary units for all applications.
- Unlimited flexibility; fast, easy positioning over 360°.
- Blowers attachable to units or mounted at remote points.
- Units can be connected in series.
- Available in 9, 12 or 15-ft. reach units.
- Complete installation can be easily done by your own men.
- Engweld Exhausters come complete with mounting brackets.

WRITE FOR NEW CATALOG WE-12

ENGWALD CORP.

125 Sheridan Blvd., Inwood, L.I., N. Y. • FRanklin 1-2222

Liquid flux

A new general purpose liquid flux is now available for use with all soft solders. It is for stainless steel, chrome, monel, copper, brass, cast iron, nickel, nickel silver, steel, gold, sterling silver and bronze. Duzall eliminates precleaning of parts, removes surface oxides, and vastly expands the capillary action of all soft solders, even on deep joints and tough-to-solder applications, says manufacturer. It is non-acid, eliminating acid fumes. Comes in 4-oz containers to 55-gal drums. *All-State Welding Alloys Co., Inc.*

Circle No. 24

Aircraft welder

A dual-head spot welder with an 11-ft reach is designed for the aircraft industry where it will be used to spot-weld through stainless steel sections. Welding electrodes are located at the extreme tip of the long, box-section arms, which may be set to operate in either the horizontal or vertical plane at constant height. Pressure at electrodes is 1,200 to 1,500 psi, obtained through hydraulic boosters. *Precision Welder and Flexopress Corp.*

Circle No. 25

Non-ferrous brazing

A copper (80%)-phosphorous (5%)-silver (15%) alloy for brazing non-ferrous metals only, Phos Sil 15 starts to melt at 1,185 F and is completely fluid at 1,300 F. For use only on copper, brass and bronze. Tensile strength is 86,000 psi. *American Brazing Alloys Co.*

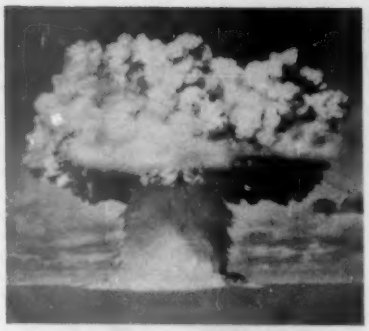
Circle No. 26

Electrode pressure gage

A new electronic force gage measures pressure exerted by electrodes of resistance welders. The self-contained unit has a transistorized amplifier and its own power supply. Panel controls are provided for checking the batteries and for calibration,

ensuring accurate results each time the gage is used. An 8-ft cable connects amplifier with a transducer unit which is hand-held between jaws of welding machine while welding current is turned off. Operation of force gage is simple, and precision components are strong enough to withstand daily shop usage. *Control Devices Inc.*

Circle No. 27



Toughest Test

Safest Safe

Best Cars

Behlen frameless welded metal buildings still stood after atomic blast test. They were welded with Murex electrodes.

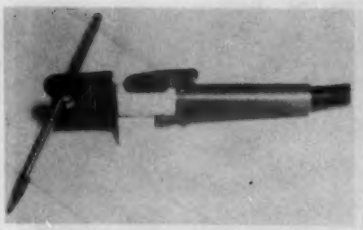
Mosler Safe Company used Murex electrodes in welding the mammoth vault that each night safeguards our nation's original historic documents in their display cases.

More than one out of every four cars produced today in the U. S. has frame welded or body unitized with Murex electrodes.

So it goes. For quality welding, welding engineers specify—and weldors ask for—Murex electrodes. Write for literature.

M&T welding products

METAL & THERMIT CORPORATION
General Offices: Rahway, New Jersey



Gouging torch

The H-55 torch is a heavy-duty model for industries whose work requires air on both sides of the electrode. Primary applications are in foundries for flash removal, and cutting holes on similar jobs which require frequent reversal of travel direction. An improvement on the Model H-55 is the push button air control valve in the torch handle. Either ½ or 5/16-in. diameter electrodes can be used. It is heavily insulated to guarantee long maintenance free service. *Arcair Co.*

Circle No. 28

Zinc eliminator

Dark colored furane resin, Jet-Kote, is brushed on metal sheets or castings prior to zinc galvanizing in selected areas to be subsequently welded or bonded. In this manner, deposits of zinc are eliminated from these areas where their presence would be harmful to weld quality. During galvanizing, the film chars and decomposes, and is later wire-brushed off. During charring zinc deposit is prevented. Quality welds for aircraft, missile and marine service are aided by this process, says manufacturer. *Furane Plastics Inc.*

Circle No. 29

Gas salamander

Model 200 LP gas salamander features a furnace type burner with double primary air injection resulting in greater heat output and fuel economy. A new 100% automatic safety shut off has also been added, incorporating a pilot burner for greater safety and a throttling valve for adjustable heat control. *Wemco Products.*

Circle No. 30

Data on over 1000 types and sizes

electrodes and welding wire

Send for this free Murex Electrode Selector giving data about one of the broadest lines of electrodes for arc welding, and wire for semi or full automatic welding.

Mild steel and low alloy, stainless, non ferrous, iron powder, hard surfacing electrodes . . . whatever you need you'll locate quickly in its pages . . . the right electrode for the right results. Send for your copy today.

M&T welding products

METAL & THERMIT CORPORATION
General Offices: Rahway, New Jersey

Job Report Courtesy of
Alco Products, Inc., Schenectady, N. Y.

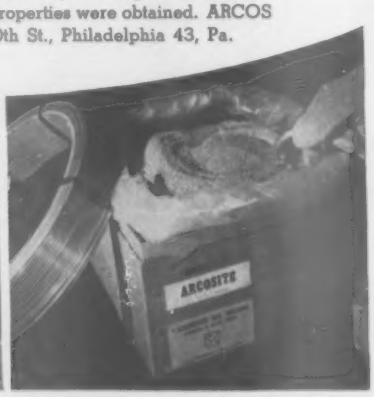
Nuclear pressure vessel stainless clad at low cost

USE ARCOS

STAINLESS WIRE and BONDED FLUX

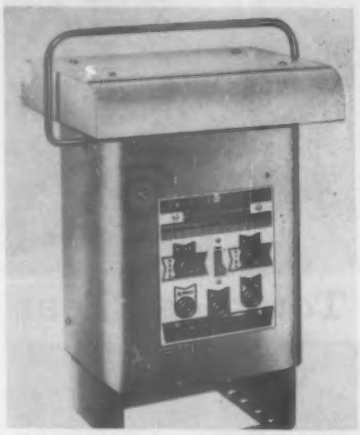
This "barrel" is one of several that comprise a nuclear pressurizer to operate under highly corrosive conditions. To reduce costs, Alco Products forged the shell of ASME A-336, 2—4 inch thick manganese molybdenum steel and clad the inside with stainless. The illustration shows the second pass overlay which was made by submerged arc using Arcos Chromenar K-LC (Type 308) bare wire and Arcosite S4 flux. Lower cost, and high corrosion resistance with optimum physical properties were obtained. ARCOS CORPORATION, 1500 South 50th St., Philadelphia 43, Pa.

Bare Wire



Arcosite Flux

205-amp welder

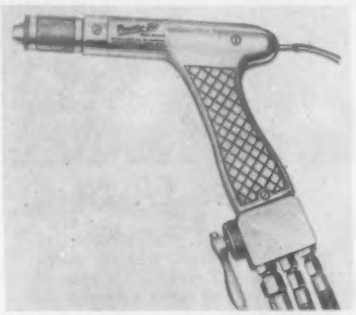


Portarc 205 is a hand portable, 205 amp welder suitable for production welding or tacking. It is especially designed for all industrial and commercial applications that require manual welding and has a full 60% duty cycle plus an 80 open circuit voltage from six 135 through 205 amp heat taps. A low open circuit voltage feature is optional on the 230 or 460 volt models. *Emerson Electric Mfg. Co.*

Circle No. 31

Metallizing guns

Two new metallizing guns have vacuum feed which does away with horizontal-spray limitations, says manufacturer, permitting a positive, even flow of powder to be sprayed from any angle. Vacuum feed, produced by movement of gases through the gun, eliminates all usual problems of condensation in powder guns using compressed air. Since powder feed is at gun, powder and compressed air do not mix until emitted. This exclusive feature and the separate hopper provide infinite flexibility of operation with powders from 100 to 500 mesh. Two guns are available, one for ceramics and one for hardfacing. *Metallizing Co. of America.*



Circle No. 32

Interested in new products in the safety field? See pages 34 and 35

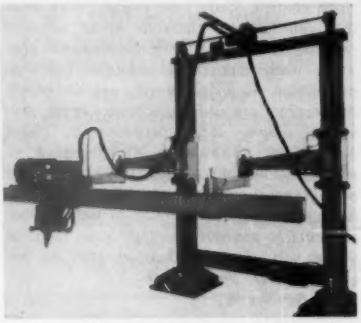
Welding torches

Newly designed welding torches and cutting attachments feature a new valve which, among other advantages, solves a common problem in the industry, that of flame adjustment being too easily altered if the valve knob is accidentally struck. In new valve, nylon collet inside nut eliminates problem. Tightening nut on valve body causes nylon to bite into thread of valve stem eliminating end play or back lash. The use of O-ring packing in valve assembly ensures gas tightness whether the nut be loose or tight. *Canadian Liquid Air Co.*

Circle No. 33

Welding fixtures

A new line of automatic welding fixtures employing the Pantograph principle is now available in two models: a standard twin arm Pantograph and a standard single arm. Pantographs precisely and rigidly position



welding head with single arm unit able to be set up for inside welding. Other features are high speed set-up time, straight line welding to 16 ft on standard models, simplicity in alignment of travel carriage with seam to be welded, and other time saving advantages. *L & B Welding Equipment Inc.*

Circle No. 34

Copper brazing alloy

New brazing alloy 211 replaces silver solder and does not require flux on copper to copper joints. Can be used on copper, brass and bronze. It is a ductile rod, adaptable to all phases of maintenance work, construction, etc. Alloy comes in 1/16, 3/32, ⅛, 3/16 and ¼-in. diameters. Melting point is 1,300 F, brazing range 1,350 to 1,550 and tensile strength 40,000 psi. It is composed of 93% copper, 7% phosphorus. *American Brazing Alloys Co.*

Circle No. 35

Infrared lamps

A new line of quartz infrared lamps for military and industrial applications includes five lamps in ratings from 500 to 1,350 watts. Since they heat to a temperature greatly in excess of 1,000 F, their many possible industrial applications include heat treatment, stress relief, drying, baking, etc. Lamps are said to be so resistant to thermal shock that ice water can be poured over a red-hot lamp without danger of cracking. *Westinghouse Electric Corp.*

Circle No. 36

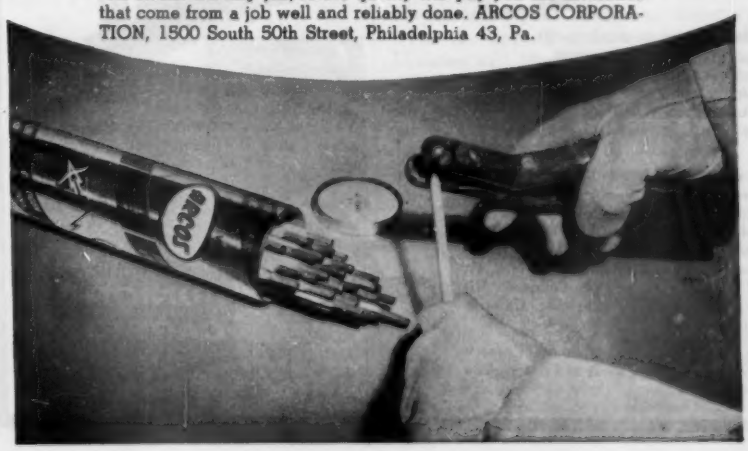
Job report courtesy of Superior Welding Company, Decatur, Ill.

When requirements demand *more than* the "ordinary" in Stainless Welds

WELD WITH ARCOS

STAINLESS ELECTRODES

This vessel shell will become part of a high vacuum melting furnace. It is constructed of 304 ELC stainless steel except for supporting lugs and minor fittings of carbon steel. The stainless section was welded with Arcos CHROMEND K-LC Electrodes to assure sound, leak-free welds under high vacuum operating conditions. The chemical analysis of Arcos CHROMEND HCN proved highly successful for joining the dissimilar base metals—carbon and stainless steels. On *any* job, Arcos quality will pay you the dividends that come from a job well and reliably done. ARCOS CORPORATION, 1500 South 50th Street, Philadelphia 43, Pa.

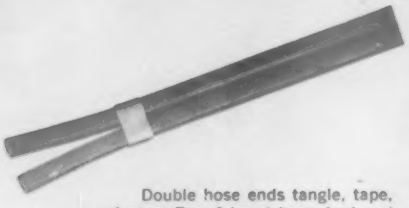


Oxweld GUIDE

TO BETTER WELDING AND CUTTING

Six popular accessories...and why so many experienced welders prefer them...

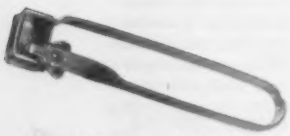
Large vented nylon cups fit comfortably over prescription glasses. No. 24 Goggles lift with one hand because the bridge is rigid. Standard AA green lenses, 3 shades.



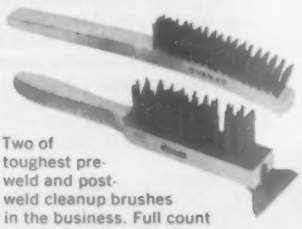
Double hose ends tangle, tape, confusion. Two 1-braid lines (red and green) molded side by side for easy handling. Tough but flexible connecting web, smooth cover.

Eliminate clogged tips with OXWELD Tip Cleaners. Remove oxides and carbon deposits without damaging accurately dimensioned ports. Master set cleans 46 drill sizes.

OXWELD Welding Gloves are luxuriously soft, yet tough and long-wearing. Long gauntlet protects wrists and forearms. Suede leather, flame-resistant fabric, or combination.



OXWELD Lighter provides fat, sure-fire spark every time, because flint strikes file at an angle. Self-cleaning file turns automatically, will not clog or fill up.



Two of toughest pre-weld and post-weld cleanup brushes in the business. Full count of firmly anchored wires. Scraper makes short work of dirt, flux residue, and spatter removal.

Call your LINDE Distributor for prompt service on any welding or cutting need. Or write for his name and address to: Dept. 510, LINDE COMPANY, Division of Union Carbide Corporation, 30 East 42nd St., New York 17, N.Y. *In Canada:* Linde Company, Division of Union Carbide Canada Limited, Toronto.

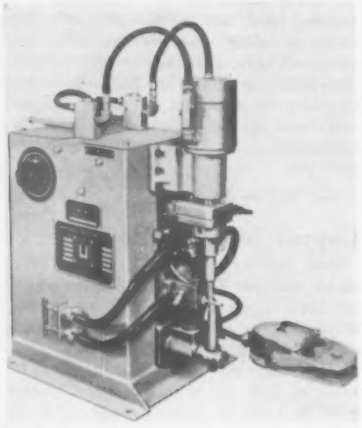
"Linde," "Oxweld," and "Union Carbide" are registered trade marks of Union Carbide Corporation.

Linde UNION CARBIDE

CO_2 manual welder

A new, optional version of CP C-OManual Button Welder is designed especially for high-production rate in automotive, appliance and similar plants where manufacturing lines are automated. The Auto-Special basic equipment package consists of a constant-potential 600-amp power source with slope control, Stellarweld reactor, wire drive that can feed an electrode at an adjusted rate of speed, and a semiautomatic gun. These make equipment adaptable for high production work: all power, gas and water connections are quick-disconnect type, providing simple, rapid maintenance; major components of package are designed to permit a flexible choice in locating the power source and wire drive; an electronic timer provides precise timing of weld period, particularly necessary on light gage material where very short weld times may be required. *A. O. Smith Corp.*

Circle No. 37



Bench welder

A small, press-type bench welder is designed for extra fine and critical welding. Produced in models with capacities ranging from 5 to 50 kva, the new machine is one of a new line of single phase welders developed for the resistance welding of all types of weldable metals. It is air actuated, has adjustable upper and lower arms and holders, and comes equipped with foot switch. A light-metal ram operating in a lineal ball bearing sleeve and a precision diaphragm cylinder help to give the machine its special adaptability for fine, critical welding work. *Universal Electroweld Div., Electric Arc Inc.*

Circle No. 38

COMMANDO

DRILL KIT

- Lighter weight—made of aluminum
- 12 High-carbon steel drills the most practical tip-cleaning tool made. Cleans and trues most standard orifices. Contains even-numbered drills from size 52 to 74. Room for extra drills in case.

OTHER COMMANDO PRODUCTS

★ Replacement drills
★ Lighters and flints
★ White metal welding rod
★ Goggle head bands
★ Ferrule crimper
★ Soapstone holders

Buy at your local welding supply dealer

J. M. EAGLE INDUSTRIES

2715 OAK STREET • KANSAS CITY 8, MO.

IN 1936, MORT CLARK, then Vice-President of the world's largest sign manufacturer, wanted a welded galvanized sign frame. Every welder manufacturer said it couldn't be done . . . Mort Clark did it, received a check and certificate of achievement from the Lincoln Welding Foundation—and

MORT CLARK'S GALV-WELD ALLOY ORIGINAL & GENUINE

WAS BORN

The Navy didn't believe, tested it 3384 hours in salt spray (100 hours is normal), then approved it. Westinghouse reports Galv-Weld roof sign, installed 1936—still perfect in 1959—23 YEARS LATER!

TIME PROVEN - MODESTLY PRICED
WHY EXPERIMENT?

Regalvanizes corrosive seams and areas where galvanizing is burned away by welding, skipped in hot dip galvanizing, or abraded in fabrication.

Eliminates corrosion areas produced by welding, so that weld will stand up under paint, WITHOUT rust, as on ornamental iron. Simply use residual heat from welding, or reheat, wire brush, and apply. No fluxing—No fumes.

Makes every welder a galvanizer of small weldments or parts. Repairs chipped porcelain, rusted appliances, rusted auto, truck or trailer bodies, frames, fenders, or other steel products. Can be readily refinished to match surrounding surface.

Ideal for pipe joints, galvanized structures, water and fuel tanks, duct systems, cold storage lockers, sinks, drains, washers, towers, steel buildings, railings, etc.

Some distributor franchises still available. Cash in on consistent campaign now running in 18 national magazines.

-Mail Coupon Today-

GALV-WELD PRODUCTS
Dept. WE — Box 1303 — Bradenton, Fla.
Send Information User ☐ Distributor ☐
Dealer ☐ Free Sample ☐
Name..... Address.....
City..... State.....

About people . . .

Taylor

Moline

Smith Welding Equipment Corp., Minneapolis, has appointed *P. E. Taylor* vice president in charge of sales. Also, *D. B. Moline* was named advertising and sales promotion manager.

H. M. Peterson was appointed to the position of vice president and controller of Acrods Corp., Sparrows Point, Md., division of Air Reduction Co., Inc.

William L. White, technical consultant, has retired after 42 years with the Manhattan Rubber Div. of Raybestos-Manhattan Inc., Passaic, N. J. He joined the firm in 1917 as a chemist and was director of Research and Product Design until he asked to be relieved of some of his duties in 1957.

Joe S. Kirk has been appointed sales manager for National Electronics Inc., Geneva, Ill., manufacturer of industrial control tubes. *Daniel O. Puryear* succeeds Kirk as manager of commercial engineering.

J. Paul Montanye has been appointed application engineer for the Colmonoy Div. of Wall Colmonoy Corp., Detroit. He will headquarter at the company's plant in Montebello, Calif.

Montanye

Elliott

Edward Elliott, Jr., has been made manager of industrial-medical sales for the Liquid Carbonic Div. of General Dynamics Corp.

KNOWING what you will need IS HIS BUSINESS

Your LINDE Distributor is an independent local businessman who concentrates on knowing what you are going to want and on having it ready for you. He's a welding specialist, too, with wide practical experience and intimate knowledge of local industry. Knowing is part of his job. Maintaining adequate stocks for immediate delivery is another.

So your LINDE Distributor carries a complete line of welding and cutting equipment, industrial gases, welding rods, and supplies. He handles high-quality products of proved efficiency and recommends processes and methods best suited to your needs. His resources, plus the benefits of LINDE's 50-odd years as a leader in welding and cutting, are as near to you as your telephone.

Talk to your LINDE distributor today. Get to know him better. If you can't find his name in your telephone directory, write to: Dept. 311, LINDE COMPANY, Division of Union Carbide Corporation, 30 East 42nd St., New York 17, N. Y. *In Canada:* Linde Company, Division of Union Carbide Canada Limited, Toronto.

Linde

UNION CARBIDE

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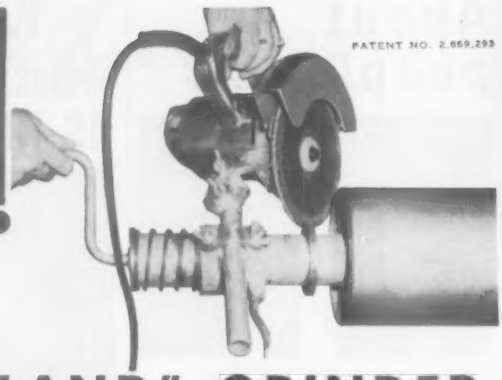
NEW! H&M "BEVEL-LAND" GRINDER



automatically cleans and lands pipe bevels

The new H & M "BEVEL-LAND" GRINDER employs an electric grinder to automatically clean and smooth pipe cuts and put the land on bevels. The machine may be placed on the pipe and in operation in less than one minute. A simple adjustment in angle of the grinding wheel is all that is required to change the machine from the cleaning to the land position. The H & M "BEVEL-LAND" GRINDER assures more postive alignment of pipe and better quality welds. The machine is available in two models: one for 6" to 14" and one for 14" to 36" pipe.

WRITE FOR YOUR COPY OF A CATALOG SHEET WHICH DESCRIBES ALL THE FEATURES OF THE NEW H & M "BEVEL-LAND" GRINDER.

H&M TM Reg

PIPE BEVELING MACHINE COMPANY
311 E. Third St. DI 3-0241
TULSA, OKLAHOMA

IT'S NEW: IT'S HANDY IT'S ECONOMICAL

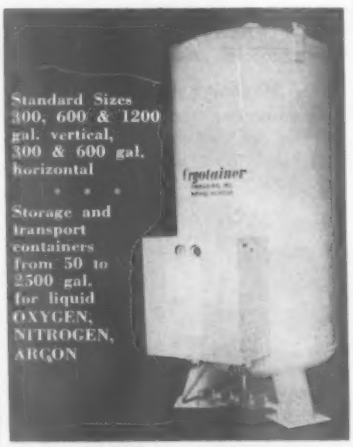
NEW "ROYAL" HARDENING POWDER IN THE NEW SHAKER CAN

- "ROYAL" Hardening Powder is more effective than cyanide. Gives off no dangerous fumes. Simplifies the work. Economical to use.
- Makes low-grade steel perform like high-grade steel.
- Enables the weldor or blacksmith to produce a finer cutting tool without technical equipment.
- Produces a .01 to .02 in. case depth with necessary Brinnell toughness on large and small low-carbon steel tools and parts.
- Send for sample and descriptive booklet.

Manufactured only by
ANTI-BORAX COMPOUND CO., INC.
FORT WAYNE 9, INDIANA

Cryotainer®

LIQUID OXYGEN
CUSTOMER SERVICE STATIONS


Standard Sizes 300, 600 & 1200 gal. vertical, 300 & 600 gal. horizontal
Storage and transport containers from 50 to 2500 gal. for liquid OXYGEN, NITROGEN, ARGON
Cryotainer

OVER 2,000 *Cryotainers*
NOW IN USE!
For details, write
Cryogenic Division
RONAN & KUNZL, INC.
MARSHALL, MICHIGAN

Gloor

Wakefield

James M. Gloor has been named works manager for Tube Turns Div. of Chemetron Corp., Louisville, Ky. This relieves *J. A. Henby*, vice president of production, for new responsibilities related to current and future manufacturing operations. The company has also made a series of other promotions: *M. T. Wakefield*, succeeds Gloor as product engineer, with Wakefield being replaced by *M. B. Densford*, now personnel manager. *H. H. George* is chief engineer, product engineering and research department; *E. C. Rodabaugh* heads a newly formed process research group; and *F. C. Smith* is head of special research projects. *Arthur McCutchan* has rejoined the firm as a special projects engineer.

National Electric Welding Machines Co., Bay City, Mich., has made several personnel changes. *Paul Thorne*, formerly chief electrical engineer, has been named chief electrical and development engineer. *Harold Bach*, former manager of the service and research section, is now chief welding engineer. The firm has established a new West Coast office which is manned by *W. M. Corns*, of Ross, Calif. *W. E. Dowling*, vice president of R. E. Duboc Associates, Denver, with *Ray Duboc*, president, services the five-state area of New Mexico, Utah, Wyoming, Idaho and Colorado. A new southern office is serviced by *H. J. Yarbrough* of Welding Alloys and Supply Co., Inc., Birmingham, Ala. To assist the Chicago office in the Eastern half of Minnesota, *Ray Schwabe* of Welding Supply and Specialty Co., St. Paul, has been named.

American Emery Wheel Works, Providence, R. I., manufacturer of grinding wheels and abrasives, has appointed *John P. Baxter* as sales representative in the Connecticut area.

Walter A. Steiner has been appointed vice-president—technology, National Carbon Co., Div. of Union Carbide Corp., New York City. He had been vice-president in charge of development.

Eugene J. Cronin Jr. has been elected vice president and general manager of the Mallory-Sharon Metals Corp. board of directors. He succeeds *F. H. Vandenburgh,* who recently retired as president of the Niles, Ohio, company.

Donald J. Murchie has been appointed general sales manager for Stulz-Sickles Co., Elizabeth, N. J. He formerly was district sales manager for the East Central States. Murchie will direct the company's sales and marketing of Manganal, 11-13½% manganese-nickel steel, and its other welding products.

Zachary Le Bolt is now general manager for Furane Plastics Inc., Los Angeles.

John K. Edmonds has been named assistant executive vice president of the American Institute of Steel Construction, New York City.

National Cylinder Gas Div., Chemetron Corp., Chicago, has named a new assistant district manager and seven special sales representatives. *J. D. Thor* is assistant in the Chicago district, previously serving as sales assistant in the midwestern area. The following companies and personnel have been named representatives to railroads for NCG rail welding and other railroad equipment: R. E. Bell Co., St. Louis, *R. E. Bell* and *R. H. Bell;* Eastern Railway Supplies Inc., New York City, *J. W. Samson, W. H. Bahrenburg, H. A. Doyle;* Stan H. Haigh Co., St. Paul, *S. H. Haigh, Jerry Haigh* and *Tom Haigh;* Donald J. Hogan & Co., Inc., Chicago, *D. J. Hogan, J. H. Callahan, J. E. Moran,* and *J. M. Norton;* Stanley H. Smith & Co., Inc., Cleveland, *S. H. Smith, E. H. Ricketts, J. J. Clark, J. B. Powell* and *J. M. Bina;* Southeastern Railway Supply Inc., Arlington, Va., *W. C. Wilson, J. B. Akers,* and *M. E. Perdue;* Don N. Roddy & Co., Denver, *D. N. Roddy.*

Died . . .

Neil A. Douglas, 56, sales manager of National Welders Supply Co., Inc., Charlotte, N. C., died Oct. 16. He at one time worked for Air Reduction Co., New York City, and was an active figure in the compressed gas industry.

QUICK way to cut downtime!
ECONOMICAL, too!

REBUILD
Worn Tractor Grousers
with
SS HI-C
TRACTOR GROUSER BARS
SPECIAL ANALYSIS HIGH CARBON STEEL

Attaches quickly with any good grade of low hydrogen electrode.

Easy to attach with any manual or automatic electric welding method.

Write for complete details and nearest distributor.

MEMBER NATIONAL WELDING SUPPLY ASSOCIATION
SOLE PRODUCERS

STULZ-SICKLES CO.
PORT AVENUE at JULIA ST. ELIZABETH, NEW JERSEY

BECKER
Keen-Cut
Electrodes

for use in CARBON ARC-AIR JET GOUGING

KEEN-CUTS—for the best characteristics of carbon and graphite in a carbon arc cutting electrode. Higher current capacity . . . longer life . . . shorter cutting time . . . greater material removal . . . smooth surface gouge . . . controllable accuracy . . . hot stable cutting arc . . . elimination of smoke and gases.

And they're low in cost. Try BECKER KEEN-CUT ELECTRODES—black or copper coated, standard diameters, 12" lengths in 150 to 1400 amp. range—for the most efficient, labor-saving electrode in carbon arc/compressed air cutting.

A COMPLETE LINE OF CARBON AND GRAPHITE WELDING SUPPLIES—carbon and graphite electrodes, carbon rods and plates, welding paste, graphite cores and chills, graphite powder and particles of any mesh.

Write for Catalog

BECKER BROTHERS CARBON CO.

3436 South Laramie Ave. • Cicero 50, Illinois

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FIRE PREVENTION AND FIRE PROTECTION (PB151695). Published by Office of Technical Services, U. S. Dept. of Commerce and prepared by Bureau of Yards and Docks, U. S. Navy, 1959. Price, $3, 190 pages. (Order from OTS, U. S. Dept. of Commerce, Washington 25, D. C.)

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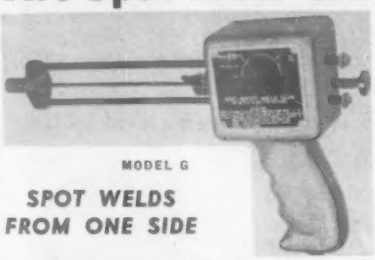

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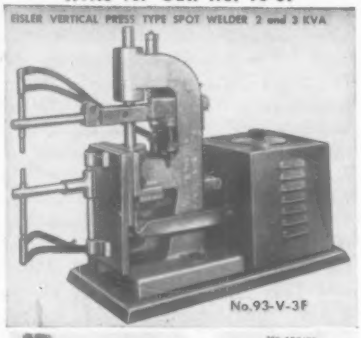

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COSTS OF NUCLEAR POWER (TID-8506). Compiled by the Office of Operations Analysis and Forecasting; published by the Atomic Energy Commission, July, 1959. Price, 50 cents; 29 pages. (Order from OTS, Dept. of Commerce, Washington 25, D. C.

The Atomic Energy Commission has issued for information, an analysis of *Costs of Nuclear Power*.

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76. BRONZE ELECTRODES. Ampco Metal Inc. "Welding News" covers overlaying of trim dies, repairing of cast-iron gears and fabrication of metal kitchen furniture.

77. NIBBLER. Fenway Machine Co., Inc. Line of portable air-powered and electric nibblers are detailed in brochure.

78. VACUUM EQUIPMENT. Invincible Vacuum Cleaner Mfg. Co. New four-page folder describes how company's vacuum equipment is used to reclaim, process and convey materials.

79. GRINDING WHEELS. Simonds Abrasive Co. Standard sizes and specifications for general purpose grinding wheels are given in File 8-1.

80. HEATERS. Insto-Gas Corp. Bulletin 259B describes company's line of salamanders, blower and infra-red heaters.

81. BARREL FINISHING. Carborundum Co. A seven-point system for scientifically controlled barrel finishing is detailed in CARBOtrol 7.

82. SEMIAUTOMATIC WELDERS. McKay Co. "How to get the most from semiautomatic welding machines," is a reprint from WELDING ENGINEER offered by the firm.

84. PNEUMATIC TIMER. Square D Co. Bulletin 9050-9 describes internally ported air system in pneumatic timer suited for applications in dusty atmosphere.

85. BUTT WELDER. Universal Electroweld Div., Electric Arc Inc. Literature describes company line of single-phase resistance butt welder.

87. WELDING CABLES. Belden Mfg. Co. Catalog lists HVF vinyl-jacketed cables, rubber and neoprene cables, neoprene whip leads, power cords for 2, 3 and 4-conductor power supply cordage.

88. AUTOMATIC FLUXING. Sight Feed Generator Co. Brochure 659 details automatic fluxing unit and flux for brazing operations.

89. BRAZING ALLOYS. American Brazing Alloys Corp. Comparison charts, specifications and other data are given for low temperature brazing alloys in brochure.

90. CO_2 MIG WELDING. Hobart Bros. Co. Booklet EW-208 is a 38-page manual on Migarc welding of mild and low alloy steels with CO_2 shielding gas.

91. HARDFACING. American Manganese Steel Div. Flyer describes Amsco 53, a manual tubed electrode for general purpose hardfacing.

92. SEAM WELDER. Federal Machine and Welder Co. Bulletin S-59 covers new line of seam welders ranging in size from 50 to 400 KVA.

93. POWER SOURCES. Air Reduction Sales Co. Booklet describes 8-step method to help one select correct welding power source for job.

94. HANDLING DEVICES. Merrill Brothers. Catalog C-2 describes applications, and details dimensions and specifications for firm's line of clamps, lifts, slings, opening tools, grips and tilters.

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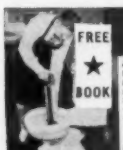

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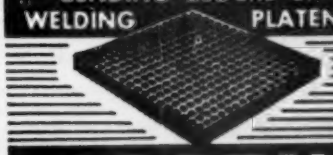

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Volume 44, WELDING ENGINEER

January to December, 1959, inclusive

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151. Alloy Rods Co.—Bulletin HS202 gives details and locations on the new "Wear-O-Matic WH" open arc welding wire.

152. All-State Welding Alloys Co.—Instruction manual available on All-State's products.

153. Anti-Borax Compound Co.—Descriptive booklet and sample of the new "Royal" hardening powder.

154. Atlas Welding Accessories, Inc.—Write for further information on the new Atlas "Easy-Grip" weld cleaning tools, with wide blades.

155. Bateman Foundry & Machine—Complete information on the "Bantam Iron Worker" and name of your nearest distributor available.

156. Bay State Abrasive Products Co.—For ideas in grinding problems send for the name of the "Bay State" distributor nearest you.

157. Becker Brothers Carbon Co.—Catalog on "Keen-Cut" electrodes, carbon rods and plates, welding paste, graphite cores and chills and graphite powder is available.

158. Bren Weld Corp.—Further information available on the Bren Weld arc spot weld gun.

159. Brown Boveri Corp.—Write for complete details on induction heating equipment for stress relieving and cost estimate questionnaire.

160. Carol Cable Co.—Further information available on Carol's "Dynapower" welding cable.

161. Chicago Boiler Co.—Complete details on the "Red Head" welding clamp.

162. Chicago Hardware Foundry Co.—Information on "Fuse-Well" cast-iron welding rods and electrodes is available.

163. Clements Mfg. Co.—Bulletins on "Clements Cadillac Model K Blowtorch."

164. Columbia Electric Mfg. Co.—Write for illustrated catalog on "Tong Test AC-DC Ammeter."

165. Contour Sales Corp.—Data available on "Curv-O-Mark" pipe-layout tools for marking pipes and structural angle cuts of any type.

166. Coyne Cylinder Co.—Information on Coyne's "92" acetylene cylinder available.

217. Curtiss-Wright Corp.—Write for further information on where to buy and how to use "Thermochrom" the temperature indicating color crayons.

167. Dockson Corp.—Write for the Head & Eye Protection catalog and name of your distributor.

168. Duro Engineering Co.—Information on the "Standard" holder and "Durogen" holder available.

169. Eisler Engineering Co., Inc.—Catalog 93-57 on spot and wire butt welders and the vertical type press welder is available.

170. Engwald Corp.—Catalog WE-12 on welding fume exhausters is available.

171. Eutectic Welding Alloys Corp.—Further information available on Eutectic "Low Temperature Welding Alloys."

172. Galv-Weld Products—Information and distributor franchises on galvanized welding and samples, are available.

173. H & M Pipe Beveling Machine Co.—Catalog sheet describing the new "Bevelland" grinder.

174. Harnischfeger Corp. — Bulletin R-29, "P&H Smootharc Welding Electrodes" is available.

175. Harris Calorific Co.—Write for further details on the new heavy duty No. 25 regulator.

176. Hobart Brothers Co.—More information on the new Hobart "AC-DC" welder is available, and the "TIG/PAK" model 1189, for in-the field inert gas welding.

177. Hobart Brothers Co.—Further information available on 3 iron powder electrodes.

178. Jackson Products—Additional information on Jackson's insulated electrode holder, the "Quik-Trik" cable connector and the "Cablehitch" for overhead suspension of welding cable.

179. Johns-Manville Corp.—Data on Aluminized asbestos cloth available.

180. Lenco, Inc.—Further information on "Threaded Power Connection" of Hi-Amp electrode holders, cable attachments and ground clamps.

181. Linde Company—Copies of Linde's 24 page, bi-monthly "Metalworking Bulletin" available.

182. Linde Company—Write for the name and address of the Linde distributor nearest you that handles "Oxweld" equipment for your welding or cutting needs.

183. Liquid Carbonic Div. General Dynamics Corp.—Illustrated literature on "Liquidweld" apparatus is available.

184. Lummis Mfg. Co.—Write for information on the "Key-Bak" key reel for your weldors.

185. P. R. Mallory & Co.—Write for catalog "Standard Resistance Welding Electrodes."

186. Manhattan Rubber Div.—Further information available on Moldiscs Abrasive wheels for weld grinding.

187. Markal Co.—Literature and pellet samples of Thermomelt temperature indicators available.

188. Merrill Brothers—Write for further information on Merrill's material handling devices.

WELDING INFO-AIDS

USE THIS CARD for Literature, Catalogs, and Bulletins shown on preceding pages and for those featured in this month's ads as listed opposite and on following page

Also information about

NEW PRODUCTS described on pages 70 to 76

AND SAFETY NEW PRODUCTS described on pages 34 and 35

Every month WELDING ENGINEER lists many new catalogs and bulletins available from manufacturers. All are yours for the asking. However, this service is valuable to you only if you use it.

USE POSTPAID CARD →

★ For copies of any manufacturers bulletins described on these pages circle the number of the items on card at right. Fill in your name, title, company and address. This has to be done only once on either post card. You need no postage.

★ For additional information on New Products described in this issue, circle the numbers of the items that interest you. The New Products section begins on page 70.

WARNING!

Illegible or incomplete addresses may keep you from receiving the information you desire. And remember, cards postmarked after the deadline date cannot be processed.

★Post card not valid after three (3) months. After that, write *directly to the manufacturer*, describing fully the information and/or literature wanted.

Name_____ Title_____

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WELDING ENGINEER, P. O. Box 28, Morton Grove, Ill.

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Welding Info-Aids,
Welding Engineer
P.O. Box 28
Morton Grove, Ill.

Literature offered in ads

(Continued from page 88)

189. Metal & Thermit Corp.—Write for information on M&T "Murex" electrodes and their complete line of welding machines.

190. Metal & Thermit Corp.—Send for a copy of "Murex Electrode Selector" giving data about electrodes for arc welding, and wire for semi or full automatic welding.

191. Metalloy Products Co.—Testing sample of "Galvalloy" available for your galvanizing job.

192. Miller Electric Mfg. Co.—Complete specifications on the "Big Twin" and "Little Twin" welders will be sent on request.

193. National Carbide Co.—Additional information available on calcium carbide and name of your nearest distributor.

194. National Welding Equipment Co.—Send for illustrated folder #17 on the combination welding and flame cutting outfit called the "Five Star Pak."

195. Norton Co.—Form 1748 available on Norton reinforced wheels for your grinding jobs.

196. Page Steel & Wire Div.—Folder containing information on submerged arc and inert gas automatic welding wire, and chart is available.

197. Phelps Dodge Copper Products Corp.—Information on Phelps Dodge "Habirprene" arc welding cable is available.

198. J. M. Ragle Industries—Write for further information on the "Commando" drill kit and other "Commando" products.

199. Ronan & Kunzl, Inc.—Information available on liquid-oxygen storage and transport containers.

200. Ruemelin Mfg. Co.—Detailed information on the Ruemelin fume collector is available.

218. Saxe Welded Connections—New 1960 manual available for structural welding practice as applied to Saxe welded connection units for welded assembly.

201. Shawinigan Products Corp.—Write for further information on calcium carbide and name of your nearest distributor.

202. Smith Welding Equipment Co.—Further information on Smith's "Saf-T-Pak" regulator available.

203. Special Chemicals Corp.—Write for a free working sample of silver brazing flux, "Kwikflux."

204. Stoody Company—Further information on Stoody Nickel Manganese electrodes available.

205. Stulz-Sickles Co.—Complete details on tractor grouser bars and name of nearest distributor is available.

206. Tec Torch Co., Inc.—Write for further information on the new Tec "Pencil" torch with off-set gas nozzle and off-set chuck for welding in normally inaccessible areas.

207. Tempil Corp.—Further information on "Tempilstiks", the temperature indicating crayons is available.

208. Tennessee Fabricating Co.—Catalog on casting designs, welding rods, tubing and machine tools and supplies is available.

209. Thermacote Co.—Sample available of "Thermo Sta-Kleer" cover lens and literature.

210. Tuffaloy Dept., Air Reduction Sales Co. —Catalog and prices on Tuffaloy spot welding tips, tip holders and adapters.

211. Tweco Products Co.—Information on Tweco cable connectors and catalog available.

212. Vee-Arc Corp.—Further information on the Vee-Arc portable grinder available.

213. Victor Equipment Co.—Write for detailed information on how to apply Victor hardfacing alloys to wearing parts.

214. Victor Equipment Co.—Profitable dealerships open in a few areas, if interested circle No. 214.

215. Westinghouse Electric Corp.—Further information available on the "Baltospot" X-ray unit and other industrial radiographic-fluoroscopic equipment.

216. Westinghouse Electric Corp.—Write for further information on the new Silicon compact Rectifier Welder.

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DOWN-TO-EARTH FACTS about cable connectors

Add On Cable — Take Off Cable
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Remove Cable — Prevent Theft
For Quick Detachable Whip Cables
Splice Cable — Repair Cable

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Quick Detachable Locks with ¼ Turn
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